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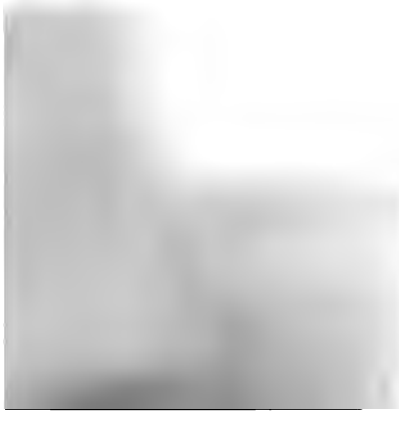

TRANSACTIONS

OF THE

TWENTY-SEVENTH ANNUAL MEETING

OF THE

Ohio State Medical Society,

HELD AT

PORTSMOUTH, JUNE 11, 12 and 13, 1872.

CINCINNATI:
BOSWORTH, CHASE & HALL, PUBLISHERS.
1872.

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TWENTY-SEVENTH ANNUAL MEETING

OF THE

Ohio State Medical Society,

HELD IN

PORTSMOUTH, JUNE 11th, 12th and 13th, 1872.

FIRST DAY.

MORNING SESSION.

The Society met in Wilhelm's Opera House at 10 o'clock and was called to order by the President, Dr. W. W. Dawson, of Cincinnati.

Rev. Dr. Burr, of the Episcopal Church, opened the meeting with prayer.

Vice Presidents Drs. C. P. Landon, E. Sinnett and J. W. Russell took seats on the stand.

Secretary Dr. J. W. Hadlock was present.

Ex-President Dr. Hempstead was escorted to the stand and introduced as one of the earliest Presidents of the Society. Also ex-Presidents Drs. Stevens, Kincaid and Dunlap took seats on the stand.

Dr. Jones, of Portsmouth, moved that the reading of the minutes of last year's meeting be dispensed with. Carried.

REPORTS OF COMMITTEES.

Dr. Pixley made the report of the Executive Committee as follows:

Your Executive Committee wish to report that they have

secured the use of Wilhelm's Opera House for the Society.

The Committee suggest that the meetings be held at 9 o'clock A. M. and at 2 o'clock P. M. On Wednesday at 9 o'clock A. M., election of officers; at 2 o'clock P. M., President's Address; at 4 o'clock P. M., display of Water Works; at 9 o'clock P. M. the Society is invited to a banquet given by the citizens at the Opera House. Thursday at 11 o'clock, invitation to visit Gaylord & Co.'s Rolling Mills, and Burgess' Steel and Iron Works.

Arrangements for the reduction of fare to members and their families have been made with the following railroads, viz.: Marietta and Cincinnati, Cincinnati, Hamilton and Dayton, Cincinnati, Sandusky and Cleveland, Columbus and Hocking Valley, and the Baltimore and Ohio.

A. B. JONES, M. D., *Chairman*,
C. M. FINCH, M. D.,
M. S. PIXLEY, M. D.,
L. SCHWAB, M. D.

Dr. A. B. Jones, of Portsmouth, welcomed the Society in the following neat address:

MR. PRESIDENT, Gentlemen of the Ohio State Medical Society, and others: — The profession of Portsmouth has made it my pleasing duty to formally extend to you their kindliest greetings. This I do with mingled emotions of pride and pleasure. Of pride when I reflect that this Society has numbered among its members physicians, surgeons, and specialists peers to any the world has ever produced, and upon whose worthy shoulders now rests the mantles of the great departed. Of pleasure in giving my right hand

with the hearty God-bless-you to our home—to our quiet little city.

We all, both in and out of the profession, fully appreciate the very distinguished honor you have conferred upon us by bringing here the ripe sheaves as the fruit of your past year's sowing, working and reaping, to be garnered among us. Then let us rejoice and make merry together, and when the day's work is done, remember the last load of corn for the year has been brought home; and when you retire to rest to-night, have no nervous or fitful dreams for fear the loud rattling of the door-bell may summon you in the still watches of the night to again go over and over your weary rounds with your still more weary limbs.

We hail your advent in our city as the dawning of a new era in our profession here. So many great and good men whose lives and energies have been devoted to the relief and comfort of others, can not come and go without leaving an impress behind them of good. I trust our meeting together on this occasion will not only be a pleasurable but also a profitable one, and that each one of you may return to your respective fields of labor and usefulness refreshed in body, strengthened in mind, and cheered with hope—hope of the hopeful, whose reward consists in the self-gratulatory feelings of having done one's duty, by lightening the burden of life which man inherited when he fell, and brought "death into the world, and with it all our woes." Yours can never be the reward of gold. Schiller tells us that at the sharing of the earth the husbandman, the merchant, the lawyer, the monarch, all got their share, and even the parson came in for his wine, while the poet, who had been

holding up nature's mirror to each fond professor, got nothing; so in utter dismay he appealed to the gods. Jove asked him where he had been when the earth was divided. "I was," said the poet, "with thee, and so enraptured was I with thy world as to love every portion of it." "Alas, alas," said the god, "earth is given. Field, forest and market, and all. What say you to quarters in heaven? We 'll admit you whenever you call." Now, gentlemen, I have no doubt but the gods have reserved a place for the doctors up there with them, and if so, I know you will be thankful.

Another year since last we met has closed its book and stamped its record forever. Time, too, with his sickle has been reaping. He spared not even the healer; and among them has he taken into the dark beyond, the immortal Blackman, whose name is now never spoken either by friend or foe without profound admiration. Many others of us have gone over into the unknown world to shed their luster there; and, methinks, that as one by one of our social few goes over, it will lessen the darkness of the gloom, and soon, very soon, our society will number more there than here. Then let us forget not, while we are trying to cool the fevered brow or relieve the burning thirst, to drink deep ourselves of the pure waters of Siloam.

Report of Executive Committee was adopted.

Dr. E. Sinnett with appropriate remarks presented to the Society a beautiful silver-mounted gavel.

The President returned thanks for himself and all future Presidents of the Society for this timely, useful and handsome present.

REPORTS OF COMMITTEES.

Reports of committees being called for, a number were announced ready to report.

REPORT OF TREASURER.

The report of the Treasurer showed a balance of $12 81 in the treasury. Report received and referred to committee on Finance.

Dr. W. J. Conklin, of Dayton, was, at this juncture, appointed Secretary *pro tem.*

MISCELLANEOUS BUSINESS.

Dr. Bartholow moved that all papers be read by abstract not to exceed twenty minutes in reading. After some discussion, the motion prevailed, when Dr. J. B. Thompson moved a reconsideration of the matter for the purpose of so modifying Dr. Bartholow's motion that the rule shall not apply to the reading of papers this year. A reconsideration was had, and Dr. Thompson's modification prevailed.

VOLUNTEER PAPERS—REPORTS OF CASES.

Volunteer papers being called for, Dr. Bartholow announced a paper on "*Aneurism of the Basilar Artery.*"

Dr. E. Sinnett read a report of "*Two Cases of Monstrosity,*" as follows:

MR. PRESIDENT AND GENTLEMEN: — Since our last annual meeting I have had, in my obstetrical practice, two cases of Monstrosity, a brief report of which I have thought advisable to present at this meeting.

Mrs. R., No. 1, was confined in July, 1871, with no unnatural symptoms or peculiarities in her case, either before or at the time of her confinement. On making an examination during the early part of her labor, I was somewhat disconcerted at finding what appeared to be a double-headed child. Labor progressed naturally, and, in due time, the mother gave birth to a female child which had attached to the head, over the occiput, a tumor or enlargement, four inches in diameter either way, that was connected with the brain through the posterior fontanelle by a pedicle or neck one inch in diameter, thus forming a perfectly well-developed "chignon" of brain substance. It was evidently a child with double brain, for the tumor had well-defined lobes and hemispheres, and the natural divisions into the cerebrum and cerebellum were very distinct.

The skin covering this enlargement was of a natural color, and slightly covered with hair. There was no osseous formation underneath the integuments. The peculiarity and interesting point connected with the history of this case is the fact that during the early period of pregnancy, the husband and wife had quite a spirited and quarrelsome discussion in reference to the propriety of the wife wearing a large "chignon."

Does this case prove that deformities may be produced upon the fœtus by mental impressions made upon the mother during early pregnancy? Or, is it simply a deformity to be classified with spina bifida? I am inclined to the latter opinion; however, taken in connection with the divided opinions entertained upon this point, the case is suggestive.

August 20, 1871, I was called to see Mrs. R. No. 2, who

was some eight months advanced in pregnancy with her fourth child. I found her not a little excited at the unexpected discharge of the liquor amnii, occasioned, as she supposed, at the sight of her brother, who had, a few hours before, been severely kicked by a horse, and brought home in a mangled condition. This flow was not accompanied with pain, or in any way anticipated by the patient, and upon my arrival, she stated that she "felt as well as before the waters broke, and that the motion of the fœtus was very distinct." Perhaps I may as well add here that she claimed to have felt motion every day up to the period of her confinement.

As she resided only a short distance from my office, I enjoined perfect rest and quiet, and left her with the understanding that early notice should be given me upon the appearance of any symptoms indicating the approach of labor. For six weeks next following this occurrence, she enjoyed as good general health as could be expected. But, from the fact above stated, and that she was much larger than usual under similar circumstances, she was daily impressed with a fearful anxiety about the results of her case. October 3d I was summoned to attend her in actual labor. When the pains had become regular and somewhat severe, I made the usual examination, and found a head presentation; but, as there was no perceptible advancement of the child, I allowed the case to progress for several hours. When I made my second examination, I was somewhat surprised to find that the child remained precisely in the same position that I had found it upon my first examination, namely—fully up in the pelvic cavity, and high up in the uterus.

Notwithstanding the uterine contractions were severe and almost continuous, there was not the usual advancement expected in such cases. As the os uteri was fully dilated, I decided to administer the fluid extract of ergot, even during this period of strong uterine contractions. In this I failed of producing any noticeable change in the position of the fœtus, for I was particular upon the recurrence of each pain, during the administration of the ergot, to have my finger in contact with the child.

At this stage of the case, I introduced my hand fully up into the uterus, and grasping the feet, drew them down, with the expectation that a change would soon occur. Again I was disappointed, for the body remained fixed as before. After quite a number of strong uterine contractions, accompanied with decided traction of the limbs, I was still disappointed in not producing more advancement of the child, and came to the conclusion that a deformity existed to such an extent as to obstruct the natural passage of the child into the pelvis. I took the limbs in my left hand, while I passed my right hand high up into the uterus, so that my fingers rested upon the shoulders of the child. Then, by continuous and firm pressure, I attempted to draw the child down, but without effect. This I continued to do, only changing my fingers from the shoulders to the mouth of the child, until I became convinced that the deformity could not pass the superior straight without some reduction. I then, with great difficulty, passed my hand up to the fundus of the uterus, where I found a large mass which I at once decided to be a hydrocephalic head. By continued manipulations, I succeeded in puncturing the integuments, so

that a portion of the fluids escaped. Immediately following this, the child was brought down with comparatively little effort, a success which afforded great relief to the mother, as well as to myself.

The child was perfect in all respects excepting the head. This measured twelve inches from the os frontis to the occiput, and five inches from the ear to the vertex as it lay upon the table, and it must have contained three or four pints of fluid.

There is no question in my mind but that this hydrocephalic head was entirely above the pelvis proper, and that its bulk was so great as to prevent its passage into the pelvic cavity without some reduction. I am impressed with the idea that this is a very unusual case, for in the authors which I have consulted, I have failed to find the report of any case where the head was so enlarged as to be confined above the brim of the pelvis. I, of course, do not claim that such cases have not been reported, but only that they have not come under my notice.

Now, what are the questions to be decided in this case? Did the shock occasioned by the sight of her injured brother alone produce the premature discharge of the liquor amnii, or had the child's head become so large as to have produced rupture of the membranes? Or was the head of a natural size at the time of the rupture, and was that the period when hydrocephalus commenced?

These are questions which I have not fully settled in my own mind, and hope to hear from those who have been so unfortunate as to have had such cases under their care.

A CASE OF HEART COVERED WITH A SHIELD OF BONE.

Dr. Gay presented a pathological specimen of heart with history of case, as follows:

Mr. A., aged 28, came into the hospital of the Ohio Pen itentiary, February, 1871. At the time of his admittance he stated that he had been for the past eight or nine years under treatment for "liver complaint."

On examination, we found the lower margin of the liver on the right side five inches below the ribs. From all the symptoms present, his case seemed to be one of *fatty degeneration of the liver.* On further examination some months subsequently, we found he had tuberculous deposits in the left lung. At this time dropsy of the abdomen and oedema of the lower extremities supervened. He was temporarily relieved from time to time of this dropsical trouble by the use of the usual remedies, but the effusion continued to return and he died from exhaustion March, 1872.

Dr. Clark, superintendent, made the post mortem. The liver was nearly twice its normal size, and was a well-marked specimen of fatty degeneration of that organ. There was, also, large masses of tuberculous deposits at different points in the liver, which, I think, were deposited subsequent to the fatty disease. The other viscera of the abdomen were quite healthy.

In the left lung was found great quantities of tubercular deposits—a large abscess with adhesions to the pleura. The muscular system was well developed and of good color.

On continuing our examination, we found this heart, covered with a bony shield, as you see. The bone covering the

anterior and part of the posterior surface of the heart measures, transversely, four and a half inches; vertically, five and a half inches, extending over the apex; and over the posterior surface, one and three-fourths inches; and at many points the shield is one-eighth of an inch in thickness, and very firm. On the line opposite where the two ventricles are attached, the bone is quite thin, both anteriorly and posteriorly.

From an examination of the sawed edges of the bony shield, I think the formation was congenital, and not a transformation of the pericardium. On the right side, the pleura is healthy, with no diseased attachments; on the left side, we found disease extending from the left lung, which contained much tubercular matter with abscess. The cavities of the heart were larger than normal; the valves healthy and sounds natural but feeble, impulse slight, action regular but slow, circulation good in both extremities. He had great difficulty in breathing after the lung became affected, but not before.

Remarks were made on the case by Drs. W. W. Seely and J. T. Whittaker. In answer to Dr. Bartholow, Dr. Gay stated that a specimen of the bony case had been subjected to microscopical examination and found to be *true bone.*

The following named gentlemen were favorably reported on for membership, and unanimously elected:

NEW MEMBERS—FIRST DAY.

Robert Wesley, M.D., Athens.
W. V. Peck, M.D., New Richmond.
David Coleman, M.D., West Union.
D. T. Davis, M.D., Dayton.
Thomas G. Vaughters, M. D., Portsmouth.
J. L. Wylie, M.D., Ripley.

The President announced the committee on Finance as follows: Drs. L. M. Jones, (of West Liberty,) E. B. Stevens, D. D. Bramble, C. M. Finch and E. Jennings.

Drs. S. S. Scoville and Bartholow were announced to read papers during the afternoon session.

The Society then took a recess until 2 o'clock P. M.

AFTERNOON SESSION.

The Society met at 2 P. M., as per adjournment, and was promptly called to order by the President.

Dr. Pixley, from the Executive Committee, reported that soda water would be served the members of the Society free of charge at the various drug stores of the city.

A question here arose as to the status of members of this Society who came as delegates from auxiliary societies. On motion of Dr. Miles the subject was referred to committee on Medical Societies.

Dr. L. A. Grimes, of Concord, Ky., and Dr. C. Honacker, of Vanceburg, Ky., were here introduced and invited to take seats with the Society.

The Finance Committee here made a partial report recommending more economy in getting out the Transactions; the Treasurer to be paid a salary of $150 annually; the Secretary to get no salary, but have his traveling and incidental expenses paid. Annual dues to be $3. Report received.

Dr. Gray moved that the salary of the Treasurer hereafter be $50 instead of $150. Carried.

Dr. Kincaid moved that the annual dues be fixed at $2

instead of $3, as recommended by the committee. Carried. Report was then adopted.

Dr. J. B. Thompson here offered his resignation as Treasurer. Resignation accepted and Dr. Gray elected Treasurer of the Society.

The President announced the committee on Medical Societies as follows: Drs. A. C. Miller, Miles, Wylie, Hough and Hyatt.

The committee on Admissions reported the following named gentlemen for membership, who were unanimously elected:

NEW MEMBERS.

A. Andrus, M.D., Westerville.
B. F. Kitchen, M.D., Clay P. O.
J. A. Warren, M.D., Wheelersburg.
D. W. Coble, M.D., Westerville.
Jas. L. Taylor, M.D., Wheelersburg.
W. A. Frizzell, M.D., Buena Vista.

Dr. J. B. Thompson resigned his place as Librarian, and Dr. Gray, Treasurer elect, resigned his place on the committee on Admissions.

Dr. E. Sinnett moved that a vote of thanks be tendered Dr. Thompson for his long and useful services as Treasurer of the Society. Motion heartily responded to.

REPORTS OF SPECIAL COMMITTEES.

Dr. S. S. Scoville, of Lebanon, having previously been announced, read a report on "*Nervous Transmission.*" The report was elaborate, read with energy, and listened to with marked attention by the members of the Society. Remarks on the report by Drs. Whittaker, Hough and Scoville, after which the report was received and referred to committee on Publication.

Dr. R. Bartholow read a report entitled, "*Some Points in the Therapeutics of Electricity, illustrated by cases.*" The report was well received and listened to attentively by the members. Remarks on the report by Dr. Reed, who reported cases confirming the position taken by the author of the report on the value of electricity as a therapeutical agent. Drs. Hough, Whittaker, Miller and Scoville also made remarks touching the report. Report received and referred to Publication Committee.

Dr. Landon moved that the Society take a recess until half past seven o'clock in the evening. Carried.

EVENING SESSION.

Society called to order by Vice President Dr. C. P. Landon.

REPORTS OF SPECIAL COMMITTEES CONTINUED.

Dr. A. T. Keyt read a report on the "*Semiological Value of Yellow Elastic Tissue in Sputum.*" The report, although lengthy, and occupied the major part of the evening in its reading, was listened to throughout with marked and critical attention by all present. Report received and discussed by Drs. Bartholow and Whittaker.

REMARKS OF DR. BARTHOLOW.

MR. PRESIDENT: — It seems to me that papers so elaborate and thorough as that just read by Dr. Keyt, should give rise to some discussion. The Doctor has collected from various sources a number of facts showing the semeiotic value of yellow elastic fibrous tissue in sputum, and he has given in addition a number of cases occurring in his own

practice. We should show our appreciation of such work not only by giving it a respectful hearing, but by discussion of the various practical questions growing out of the subject. With the view of starting discussion, I beg leave to offer the Society some remarks.

I think Dr. Keyt has not sufficiently shown the various pathological states in which the sputum may contain yellow elastic fibrous tissue. He has restricted his observations entirely to tuberculosis, when it is well known that other destructive changes in the lung tissue are characterized by the presence of this material in the sputum. Its semeiotic value as a diagnostic sign of *tubercular disease* must, therefore, be much less positive, I think, than Dr. Keyt has declared. Especially, I think, has the Doctor failed to indicate the differential diagnosis between tuberculosis and caseous pneumonia. Now, as the yellow elastic fibrous tissue is to be found in the sputa of both of these states, he should have indicated in his paper the means of distinguishing between them. As is now well known, we have in the thermometric range a pretty accurate guide to determine the difference between these two affections. To have a diagnostic value, the exact conditions in which yellow elastic fibrous tissue appears in the sputa, should therefore be shown.

REMARKS OF DR. WHITTAKER.

Dr. Whittaker remarked upon the interest of the paper, complimenting the thoroughness of its author's research. When we reflect that about one-sixth of all deaths from whatever cause are due to some form or other of phthisis, that this disease kills more than famine and plague and

sword together, that, according to the reports of pathologists with the widest range of observation, the products of phthisis are found, to greater or less extent, in nearly one-half of all lungs examined, that it is an affection which in one form snatches the infant from the breast of its mother, in another blights the prospects of life in its vigor or blanches the face of beauty in bloom, while in still another it arrests even the faltering footsteps of age, we can but hail with greatest pleasure any sign, however difficult of recognition, in its early detection and diagnosis.

The presence of the yellow elastic tissue in sputum is unquestionably a valuable diagnostic sign. Its value is increased by the almost universality of its presence, and by the comparative ease with which it may be eliminated and detected. Yet the speaker would hesitate to subscribe to its value in the sweeping terms the author has employed. We have but to recall the source of its origin to be reminded of the fact that it is only necessary that there shall be a destruction of the mucous membrane to base this tissue, when violent expulsive cough might at any time eject it as a constituent of sputum. Thus its presence is possible in bronchitis when the contents of the cavity shall have undergone decomposition to excite ulceration of the bronchial mucous membrane. It is possible in traumata, and though this objection might seem far-fetched, as the cause of the trauma would be apparent at least in the history, yet the author of the paper has himself described a case when this very mistake occurred.

Again, there are cases of phthisis the diagnosing which this sign lends us no assistance. There are cases in which

there shall have been no previous expectoration, no premonitory symptoms whatever until the first gush of blood from the mouth. There are cases, too, of partial or even total recovery when the vomicæ have been closed, ulcers cicatrized, tubercle calcified. It may be alleged that here a diagnosis is of no importance; yet every physician knows that it is in these very cases where diagnosis is most important, as on any exposure there may be a fresh explosion. In most of these cases, in other words, there is the same vulnerability of constitution throughout.

But what detracts most of all from the value of this sign is the fact that it does not enable us to differentiate between the different forms of phthisis itself—does not enable us to discriminate between the various forms of caseous pneumonia and true tuberculosis. Thanks to recent discoveries, however, this means is put in our hands. By the proper use of thermometry, we may almost, as I believe indeed, always, state which form of the disease is present before us, or when tuberculosis has supervened upon a case of caseous pneumonia. In consideration of the facts, then, that there are affections other than phthisis which may present this sign, while on the other hand there are cases of phthisis which do not yield it, it can hardly be considered safe to say that it is absolutely pathognomonic; yet from the fact that it is present abundantly, unmistakably, in the great majority of cases, it must be regarded as a most valuable contribution to the various symptoms corroborative of the presence of phthisis.

The fact that it does not differentiate between caseous pneumonia and tuberculosis proper—being present alike in

both—weakens its diagnostic value, for the difference between these two affections is marked in prognosis as clearly as though stamped in the one case by the anchor of hope, already seared in the other with the imprint of the scythe of death.

The report was then referred to committee on Publication.

Dr. P. S. Conner read a report on "*Hernia Cerebri.*" Referred to committee on Publication.

The Society then adjourned to meet Wednesday morning at 9 o'clock.

SECOND DAY.

MORNING SESSION.

The Society met at 9 o'clock, and was called to order by the President, Dr. Dawson. Prayer was offered by the Rev. Mr. Manly, of the Biglow M. E. Church.

Minutes of yesterday's proceedings were read by the Secretary and approved.

REPORTS OF COMMITTEES.

The committee on Medical societies made their report as follows:

MR. PRESIDENT:— Your committee on Medical Societies having had under consideration the matter which to them

was referred, beg leave to report the following as the result of their deliberations, viz.:

1st. That in accordance with article seventh of the by-laws of the Ohio State Medical Society, it is the opinion of your committee that societies represented by the delegates are subjects for consideration in committee and not the delegates.

2d. That in accordance with the foregoing, your committee have examined the credentials of S. S. Scoville, M. D., and J. B. Hough, M. D., regularly appointed delegates from Lebanon Medical Society; and of C. R. Reed, M. D., representing the Meigs County Medical Society; and of H. C. Watterman, M. D., of Middleport, representing the Meigs and Mason Academy of Medicine; Drs. A. Blymer and A. Andrus, Delaware County Medical Society; Dr. J. W. Coble, Central Ohio Medical Society; Drs. N. S. Hill, W. V. Peck, W. L. Anderson, A. W. Ashburn, R. B. Davy, Eugene Moore, R. C. Moore, Clermont County Medical Society; Drs. D. B. Cotton, W. J. McDowell, Scioto County Medical Society; and find that said Societies are in good and regular standing as Auxiliaries of this Society, and that said delegates, by virtue of their appointment, are entitled to a part in the deliberations of this Society.

3d. That your committee have examined the constitution and by-laws of the "Delaware Medical Institute," and find that they strictly conform to the requirements and usages of this Society, and recommend it be made Auxiliary to the Ohio State Medical Society.

4th. WHEREAS, There does not appear to be any established usage in the transactions of this Society, regulating

and governing delegates from societies made Auxiliary to the Ohio State Medical Society; and,

WHEREAS, To avoid controversies hereafter, and for the more uniform government of said delegates, be it therefore

Resolved, That delegates representing Auxiliary societies in good standing shall, upon satisfactory evidence, be entitled to take part in the deliberations of said State Society during the session for which they were elected, but shall not be entitled to membership or other considerations unless they become regular members of this Society, and pay the usual initiation fee.

Respectfully submitted.

A. C. MILLER,
J. L. WYLIE,
A. J. MILES,
E. H. HYATT,
J. B. HOUGH,
} *Committee.*

REPORT OF FINANCE COMMITTEE.

The committee on Finance after having examined the books and accounts of the Treasurer, made their supplemental report as follows:

MR. PRESIDENT: — Your committee on Finance have examined the book accounts and vouchers of the Treasurer, and find them all correct.

We recommend the payment to the estate of Dr. Hall, (late deceased) the balance of his salary for 1871, of $25; also account rendered by Dr. Hall (for postage) $2 70.

Dr. Hadlock, as Secretary, presents a bill of items, $25.20, which we recommend to be paid.

A bill for salary of Dr. Hadlock as Secretary, for $50

we do not feel authorized to allow; but we recommend the payment to Dr. Hadlock of whatever expenses he may have incurred additional to the above in performing the duties of Dr. Hall during his disabilities.

L. M. JONES,
C. M. FINCH,
E. JENNINGS.
EDWARD B. STEVENS,
D. D. BRAMBLE.
} *Committee.*

During the morning session the Executive Committee presented the following communication:

PORTSMOUTH, O., June 12, 1872.

Drs. Pixley, McDowell and Bing, Executive Committee:

GENTLEMEN: — The undersigned committee of the Board of Trade of our city, in behalf of the body we herein represent, and of the citizens generally, hereby extend to the members of the Ohio State Medical Association, now here assembled in convention, a cordial invitation to accept an entertainment to be given them by the said Board and the citizens at Wilhelm's Opera House, this evening, the 12th inst., at 9 o clock.

Very respectfully,

THOMAS DUGAN,
R. BELL,
JAS. RUMSEY,
GEORGE DAVY,
P. TAINEY,
} *Committee.*

On motion the above invitation was accepted.

The following named gentlemen were presented for membership and unanimously elected:

NEW MEMBERS—SECOND DAY.

E. D. S. Morgan, M.D., Berlin.
C. M. Wilson, M.D., Miami Springs.
H. K. Steel, M.D., Denver, Colorado, Honorary Member.
D. C. Wilson, M.D., Ironton.
Emil Arnold, M.D., Ironton.
P. Beeman, M. D., Iola, Allen Co., Ks., Honorary Member.

Dr. J. B. Thompson made a statement that Dr. R. J. McClain owes the Society near fifteen dollars, and the Doctor having been absent some years in the army, he now proposes to pay two-thirds the amount due, and be reinstated to good standing in the Society. Referred to committee on Finance.

ELECTION OF OFFICERS.

The election of officers for the ensuing year resulted as follows:

President—Dr. A. B. Jones, of Portsmouth.

Vice Presidents—Drs. A. Blymer, Delaware; J. D. Cotton, Marietta; W. J. Anderson, Newtonville; J. B. Hough, Ridgeville.

Treasurer and Librarian—Dr. S. S. Gray, Piqua, Miami Co.

Secretaries—Dr. J. W. Hadlock, Cincinnati; Dr. W. J. Conklin, Dayton.

Committee on Admissions—Dr. M. Cassat, Dr. N. S. Hill, Dr. S. S. Scoville, Dr. T. W. Gordon, Dr. E. H. Hyatt.

REPORTS OF SPECIAL COMMITTEES CONTINUED.

Dr. J. B. Hough from special committee, read a report on *Medical Chemistry*. Report received and discussed by Drs. Conner, Kincaid, Scoville, Miles, Bing, Hyatt, Gordon, Reed, and Frizzell. At the close of the discussion, Dr. Hyatt

introduced the following resolution, which was unanimously adopted, when the report was referred:

Resolved, That the sense of this Society is that a better knowledge of Medical Chemistry on the part of students preparatory to entering the profession is demanded, and that the profession of Ohio is pledged to the work of bringing about a reform in this department of medical education.

Dr. W. W. Seely read a report from special committee on *Otology.* Report received and referred to committee on Publication.

Dr. Gay, of Columbus, presented to the Society specimens of wire gauze apparatus for treatment of fractures. Society then took a recess until 2 o'clock.

AFTERNOON SESSION.

The Society met at 2 o'clock, and was called to order by President Dr. Dawson.

Vice President Dr. Landon took the Chair while Dr. Dawson reported a case of Re-fracture of the Femur. The Doctor exhibited drawings showing the condition of his patient prior to the re-fracture, and also showing the happy result of the operation. Remarks on the case by Dr. Conner.

Dr. Stevens moved that the thanks of the Society be tendered Dr. Dawson, and that he be requested to write out his remarks on the subject for publication in the Transactions. Carried.

During the afternoon session the following new members were elected:

J. P. Primrose, M.D., Nelsonville. James Moor, M.D., Ironton.
C. B. Hall, M.D., Millersport. Camillus Hall, M.D., Burlington.

VOLUNTEER PAPERS—REPORTS OF CASES.

The President announced that owing to the amount of business before the Society, Dr. Bartholow withdraws his paper on "*Aneurism of the Basilar Artery.*"

Dr. A. Andrus read the report of a case showing the front surface of a body studded with tumors.

AN ANOMALOUS CASE OF CARCINOMA.

T. L., male, age 46, temperament nervous sanguine, for several years had not been in vigorous state of health.

History of the case previous to medical attendance.—October 1st, noticeable indisposition. There was pallor of the countenance, variable appetite, constipation of the bowels, coldness of the extremities, pulse somewhat accelerated. February, 1872, experienced pain and lameness in the left hip and limb—pain at times acute and extending to the knee. There was swelling and hardness of the muscles about the hip, which for a time seemed to increase. At this time there was an inability to walk without the use of a cane.

March 25th, 1872, was first called to see the patient. *Abnormal manifestations*, general debility, loss of appetite, constipation of the bowels, urine high-colored and containing large amount of sediment, tongue coated with yellowish fur, pulse feeble, and ranging from eighty to one hundred, extremities cold, restlessness at night. There was experienced at this time pain in the right hip, extending down the limb, with swelling and hardness of the muscles. Sharp pain in the left limb had subsided. Soreness in the hips so great that there was an inability to lie upon either side,

patient being obliged to rest upon the back. There was swelling and hardness of the muscles of other parts of the body, especially of the right arm. At this period of the disease, (March 25,) there was ecchymosis in the bend of the right arm, extending over a surface from four to five inches in diameter, which in course of a few days disappeared; back also became ecchymosed, having a dark purple and yellowish hue, extending from the hips to the top of the shoulders, which condition continued until death. Some time during the forepart of March, there was observed, first upon the head, a small tubercle or tumor, in size "as large as the end of the finger." From this time to the fifteenth of March a few were noticed upon the arm, and in a few days several upon other parts of the body. After this period the development of tubercles or tumors was remarkably rapid. Within the short space of two or three weeks, from the latter part of March to the fifteenth of April, their number had augmented to one hundred and fifty or two hundred. What seemed most remarkable, they appeared to "sprout up" and become fully developed in the short space of twenty-four or thirty-six hours, attaining their full size, and making no perceptible increase thereafter.

These tumors varied in size from that of a millet seed to a hickory nut. In form, some were round, others oblong or oval; in structure, lobulated, and having an elastic feel, and were principally located in the subcutaneous cellular tissue. A large proportion of them presented no discoloration of the skin, while others were of a purple or dark purple appearance. After a full development of the diseased condition, about the middle of March, 1872, the vital

forces were rapidly overcome, and the patient sank and died from exhaustion on the 30th day of April, 1872.

Upon post mortem, there was found in the cavity of the abdomen a large number of tumors, situated upon the serous membranes, in character and size such as were found upon the surface of the body. Some were located upon the diaphragm, a large number upon the folds of the mesentery, and one or two upon a reflection of the peritoneal membrane upon the liver. There were none in the liver, spleen, pancreas or kidneys; these organs were in a comparatively healthy state. The psoas muscles were found to be in a swollen and hard condition. The chest and cranial cavity were not examined.

Upon section of a number of the swollen muscles, there was found what appeared to the naked eye extravasated blood in a partially decomposed state. After the death of the patient, several of the tumors were extirpated, and portions of two were submitted to microscopical examination, Drs. Loving and Franklin, of Columbus, taking part in the examination. From the manifestations obtained in this examination—the cell form and its peculiar structure—the conclusion arrived at was that these tumors were carcinomatous, and in character encephaloid or melanotic.

Report received, and discussed by Drs. Dunlap — who reported a similar case—Hyatt, Miller, Bartholow, Sinnett, and C. P. Landon.

Dr. Miller, with remarks, reported a case which much resembled the case of Dr. Andrus. Dr. C. P. Landon, having seen the case of Dr. Andrus in consultation, gave it as his opinion that the tumors were due to scrofulous or

tuberculous deposits. Dr. Bartholow spoke of the cases as possibly multiple adenoma, which was known to be a very dangerous form of disease, as follows:

REMARKS OF DR. BARTHOLOW.

MR. PRESIDENT: — The very interesting case which has just been detailed may receive a somewhat different explanation from that which has been given. The manner of its behavior is like that of multiple adenoma, a disease which consists in a progressive enlargement of the lymphatic glands of the body. The change which takes place is essentially a hyperplasia of the gland elements. With these alterations in the structure of the glands, we have serious changes take place in the constitution of the blood. The proportion of white corpuscles is relatively enormously increased, transudations take place into the textures, and hemorrhages occur from the free surfaces. I merely suggest that the numerous tumors which formed in the case now under discussion, may have been enlarged lymphatics. As multiple adenoma is a very fatal disease, the rapid progress in this case is strictly in accordance with the clinical history of that disease. Whilst it may be true that the case was one of adenoma, on the other hand it can readily be conceived that the conclusion finally arrived at in regard to its nature may be correct. A rapid generalization of encephaloid from a center or focus of infection is by no means an unprecedented event. The local origin of cancer, and the systematic infection from the spread of cancer elements, are now pretty generally admitted. At least, Virchow the most eminent authority of our time, in his recent work on

tumors maintains this doctrine. If there be in any case primary deposits of encephaloid, how easy to understand its rapid diffusion and the occurrence of numerous secondary deposits. To accomplish this, it is only necessary for the encephaloid matter to find entrance into a vein, and by the systemac circulation it will be distributed to all parts of the organism. Wherever these secondary deposits take place, there will be set up the same morbid process as occurs in the primary source of infection. It is quite probable, then, that the numerous tumors developed in this case, may have originated in the mode I have just described.

To this suggestion Drs. Andrus and Miller replied that in neither of their cases were there any symptoms of implication of the glandular system; on the contrary, the family history of their patients proved a cancerous diathesis.

Dr. E. Sinnett reported a case which bore some resemblance to the cases of Drs. Andrus and Miller.

The paper was then received and referred to committee on Publication.

Dr. Gay moved that when the Society closes its meeting at this place it adjourns to meet in Columbus on the second Tuesday in June, 1873. Carried.

The Society then adjourned until Thursday morning at 9 o'clock.

After adjournment the Society was entertained by a visit to the Holly Water Works, and the extensive shoe factory of Rasenberrick, Drew & Co.

At 9 o'clock in the evening, the Society was entertained by the Board of Trade and the citizens of Portsmouth, with a sumptuous Banquet, given in the hall of Wilhelm's Opera

House. The evening passed pleasantly—good eating, good music, good dancing, good "Big Medicine Man," who administered to the thirsty in a way to be remembered by all who came under his treatment.

THIRD DAY.

MORNING SESSION.

The Society was called to order by the President, Dr. Dawson, at 9 o'clock.

Prayer by the Rev. Mr. Stanly, of the Sixth Street Methodist Church.

On motion of Dr. Miller, the reading of the minutes of yesterday's proceedings was dispensed with.

Dr. Thad. A. Reamy exhibited an instrument of his own invention for intra-uterine medication.

He thanked Prof. P. S. Conner for valuable suggestions during the time he was preparing his instrument. At the close of his remarks, Dr. Reamy said he hoped the Society would accept this report in lieu of the report which he was posted to have made on the "*Surgical Diseases of Women.*"

Report received and referred to Publication Committee with orders to print.

Dr. Thomas H. Kearney read his report from special committee on "*Amputations.*" Report received and referred

to committee on publication, after remarks by Dr. P. S. Conner, as follows:

Dr. Conner agreed in the main with the views expressed in the excellent paper just read, and was glad to hear again a good word spoken for the circular method of operating, a method that had for a time very largely fallen into disuse, but that had during the last few years been to a considerable extent regaining its former importance. Besides its advantages as set forth in the report, it had an additional one in that there was avoided the possible risk in the flap operation of locking the knife in the fragments of bone in cases of compound, especially gunshot, fractures, an accident involving trouble and mortification to the operator, as the Doctor had himself seen. He could not indorse the views of the reporter on the subject of the modified circular operation, believing it to be decidedly preferable to the ordinary circular, inasmuch as it prevented the formation of the projecting corners that are both unsightly and annoying, sometimes having a positive influence in retarding the cure. The objection to it that it increased the extent of cicatrizing surface, he could not regard as one of much weight. Certainly the best stumps that he had himself made, and the best made by others that he had seen, were by the modified circular method. But after all, the method of operating was generally determined by the necessities of the case and the prejudices of the operator. Unquestionably in some localities the flap is decidedly preferable to the circular; and the speaker could not understand the preference expressed by some writers for the circular in the fore-arm and leg. As respected hip-joint operations, he must beg leave to differ

from the author of the report in his estimation of Lacauchie's method, for in some cases hæmorrhage at the time of the operation is the cause of the ultimately fatal result, and by Lacauchie's method the bleeding can be readily and very largely controlled by pressure upon the femoral just below Poupart's ligament. Respecting ankle-joint operations he felt compelled to express an unfavorable opinion, and would in his own person prefer amputation through the lower part of the leg. Between the Syme and Pirogoff operations, he preferred the latter, for if successful the stump is slightly longer and decidedly firmer; but, as expressed in the report, caries may be developed and a failure of the operation result in consequence. He had heard the great British advocate of the Pirogoff operation, Sir William Fergusson, maintain its value and advantages, and on the same day saw him compelled to reopen two carious Pirogoff stumps of his own making and saw off slices of bone; in other words, make a secondary operation two months after the primary. The speaker was disposed to consider favorably the idea of regarding the foot and hand each as a single structure, and amputating at whatever point might be necessary without regard to the various articulations.

Dr. Bing moved that Dr. A. G. Sellards, of Vanceburg, Kentucky, who was present, be admitted to the courtesies of the Society. Carried.

Dr. G. S. B. Hempstead was at this juncture elected an Honorary Member of the Society. Dr. Hempstead retired from practice fourteen years ago, after having practiced forty-three years. He was one of the original members of this Society, was its President in 1855, and is now its

oldest living member, having attained his seventy-eighth year.

The Finance Committee reported in the case of Dr. McClain in favor of his reinstatement, upon his paying into the treasury two-thirds of the amount he owes the Society. Report received and adopted.

Dr. J. T. Whittaker read a report from special committee on "*The Year's Contributions of Physiology to Practical Medicine.*" Report received and referred to committee on Publication.

Dr. L. M. Jones, of West Liberty, read a report from standing committee on Obituaries in place of the Chairman, Dr. B. B. Leonard, who was not present. Report received, and, after some remarks by members, to the effect that the report was not complete, since it did not embrace a notice of all who have died of our number the past year, was adopted.

Dr. E. B. Stevens moved that a committee be appointed to report on the death of our late Secretary, Dr. W. C. Hall. Carried. The President appointed Dr. Stevens as the committee.

Dr. A. C. Miller was appointed a committee to report on the death of Dr. Cary, of Salem.

Dr. Alex. Dunlap was appointed a committee to report on the death of Dr. Kyle, of Xenia.

Dr. A. B. Jones requested that his report from special committee on "*Relation of the Mental to Man's Physical Forces,*" be read by title and referred to Publication Committee.

On motion of Dr. Bing it was so read and referred.

A communication was here received and read by the Sec

retary, from Dr. George Mendenhall, embodying the following resolutions:

Resolved, That a committee of five, of which Dr. Clendenin be chairman, be appointed to prepare a memorial to the Legislature of this State, on the subject of public health, in accordance with the resolution of the American Medical Association, presented by Dr. Wm. T. Logan, of California.

Resolved, That this committee co-operate with Dr. A. E. Jenner in reference to the bill presented by him in the Senate of Ohio.

Resolved, That this committee shall prepare a suitable memorial and have five hundred copies printed and distributed to the members of this Society for signatures, and draw upon the Treasurer for the amount expended for same.

On motion of Dr. Conner, the resolutions of Dr. Mendenhall were so amended as to instruct the committee to report upon the subject of a State Board of Health at the next meeting of this Society.

Dr. Clendenin not being a member of this Society, the President appointed Drs. George Mendenhall, J. R. Black, P. S. Conner, G. B. Orr, George E. Walton, committee on State Board of Health.

Dr. Miller stated that Dr. Joel Pomerine had a report ready from special committee on *Puerperal Convulsions,* but was unable to be present to read his report and therefore requested to be continued on the same committee until next year. By vote of the Society, Dr. Pomerine was continued as he requested.

President Dr. Dawson gave a synopsis of his valedictory address, which was well received. The subject was that of

Medical Education. The annual wail and lamentation on that topic was not indulged in by the speaker; a more cheerful view was taken of the question. The speaker showed how rapidly we had advanced in that respect within the past twenty years, how our works on medicine were translated into foreign languages and read abroad. He also referred to the general diffusion of education by our system of public schools, and how they were auxiliary to medical education by preparing the youth of our land with a thorough primary education.

On motion of Dr. E. B. Stevens, the President's address was referred to the Publication Committee with instructions to print.

The President announced the following

STANDING COMMITTEES.

Executive—N. Gay, J. B. Thompson, J. W. Hamilton, C. P. Landon, R. M. Denig.

Publication—J. W. Hadlock, W. J. Conklin, E. B. Stevens, S. S. Gray, C. M. Finch.

Medical Societies—J. P. Bing, M. S. Pixley, A. C. Miller, Louis Schwab, J. H. Green.

Finance—L. M. Jones, E. Jennings, E. B. Stevens, C. M. Finch, D. D. Bramble.

Admissions—M. Cassat, N. S. Hill, S. S. Scoville, T. W. Gordon, E. H. Hyatt.

Obituaries—T. W. Gordon, David Cotton, E. H. Hyatt, E. Sinnett, Alex. Dunlap.

SPECIAL COMMITTEES.

Castration for Epilepsy—M. S. Pixley, Portsmouth.

Quinine—S. S. Gray, Piqua.

Progress of Surgery during the Year—P. S. Conner, Cincinnati; J. L. Wylie, ———

Exsection of the Hip Joint—D. D. Bramble, Cincinnati.

Insanity—D. A. Morse, X Roads.

Therapeutics of Alcohol—E. H. Hyatt, Delaware.

Consumption in Ohio Penitentiary—N. Gay, Columbus.

Stricture—A. C. Miller, Orrville.

Ophthalmology—J. H. Buckner, Cincinnati.

Syphilitic Affections of the Nervous System—W. J. Conklin, Dayton.

Nervous Diseases—R. Bartholow, Cincinnati.

Pathology and Treatment of Diphtheria and Scarlet Fever—J. W. Hoff.

Small Pox—E. Jennings, Dayton.

The Distinction between Caseous Pneumonia and True Tubercle—A. T. Keyt, Walnut Hills, Cincinnati.

Urinalysis—I. W. Russell, Mount Vernon.

Functions of the Spleen—S. S. Scoville, Lebanon.

Cerebro-Spinal Meningitis—A. B. Monohan, Jackson.

Skin Grafting—T. D. Davis, Dayton.

Gastric Irritation—E. Sinnett, Granville.

Incurable Diseases—J. P. Bing, Portsmouth.

New Remedies—C. R. Reed, Middleport.

Treatment of Ulcers and other Cutaneous Diseases of the Lower Extremities—C. M. Finch, Portsmouth.

Efficacy of Vaccination—David B. Cotton, Portsmouth.

Small Pox—A. G. Stevenson, New Richmond; M. Cassat, Cincinnati.

Shoulder Presentations—W. V. Peck, New Richmond.

Epilepsy—N. S. Hill, Neville.

Cataract—W. W. Seely, Cincinnati.

SPECIAL COMMITTEES CONTINUED FROM LAST YEAR.

Uterine Therapeutics—H. J. Herrick, Cleveland.

Ovariotomy—A. Dunlap, Springfield.

Vaccination—W. B. Davis, Cincinnati.

Puerperal Convulsions—J. Pomerine, Millersburgh.

Therapeutics of Mineral Springs—G. E. Walton, Cincinnati.

Gynæcology—C. D. Palmer, Cincinnati.

Chronic Diseases of the Lungs—W. Carson, Cincinnati.

Obstetric Record—J. Helmick, Cleveland.

Electrolysis—W. H. Mussey, Cincinnati.

Belladonna—J. A. Little, Delaware.

Diseases of the Larynx—R. Wirth, Columbus.

Uterine Diseases—E. B. Stevens, Cincinnati.

Diseases of the Skin—C. O. Wright, Cincinnati.

Prevailing Diseases throughout the State—J. R. Black, Newark.

Inflammations of the Chest—J. A. Murphy, Cincinnati.

Physiology—J. T. Whittaker, Cincinnati.

DELEGATES TO THE AMERICAN MEDICAL ASSOCIATION.

E. H. Hyatt, Delaware; L. M. Jones, West Liberty; E. Sinnett, Granville; M. Cassat, Cincinnati; J. D. Cotton, Marietta; L. Schwab, Portsmouth; E. Jennings, Dayton. C. R. Reed, Middleport; J. B. Hough, Ridgeville; John W. Russell, Mount Vernon; S. S. Scoville, Lebanon; C. P. Landon, Westerville; A. J. Miles, Cincinnati; T. H.

Kearney, Cincinnati; R. W. Erwin, Athens; J. W. Hadlock, Cincinnati; A. C. Brainard, Orangeville; S. S. Gray, Piqua; A. Dunlap, Springfield; J. B. Thompson, Columbus; N. Gay, Columbus; Thos. W. Gordon, Georgetown; G. W. Pullin, Logan; A. C. Miller, Orrville; W. F. Paige, Johnstown; Joel Pomerine, Millersburgh; J. R. Black, Newark; Dudley Allen, Oberlin; W. T. Ridman, Toledo; John Bennett, Cleveland; J. C. Brown, Urbana; H. Culbertson, Zanesville; H. S. Conklin, Sidney; L. S. Ebright, Middleburg; W. P. Kincaid, New Richmond; B. Gundry, Dayton; W. V. Peck, Columbus; G. Mitchell, Mansfield; J. C. Hubbard, Ashtabula; David Noble, Hillsboro; T. G. McEbright, Akron; W. D. Scarf, Bellefontaine; O. G. Seldon, Shanesville.

DELEGATES TO STATE MEDICAL SOCIETIES.

Indiana—W. H. Mussey, J. W. Hamilton, C. M. Finch, A. H. Agard, W. J. Conklin.

Kentucky—T. W. Gordon, J. T. Whittaker, H. C. Brainard, G. W. Brook, S. Loring.

New York—J. A. Murphy, T. A. Reamy, S. S. Gray, H. J. Herrick, B. F. Miller.

Illinois—P. S. Conner, J. A. Little, J. P. Wylie, Roberts Bartholow, C. B. Reed.

Kansas—E. Sinnett, S. S. Scoville, W. W. Seely, J. H. Buckner, J. N. Burr.

West Virginia—E. B. Stevens, A. T. Keyt, T. H. Kearney, J. P. Bing, I. W. Russell.

Dr. E. B. Stevens introduced the following resolutions:

1st. That the thanks of the Society are due the officers of this session for their ability and impartiality.

2d. *Resolved*, That we return thanks to the several railroad companies who have extended their courtesies to the members in attendance.

3d. *Resolved*, That we are especially indebted to the Profession, the Board of Trade, and the citizens generally of Portsmouth, for the magnificent hospitality and thoughtful attention which we have received. In the words of Rip Van Winkle, "May they live long and prosper."

A rising vote was given in the affirmative to all the above resolutions, when, twelve minutes to 12 o'clock M., the gavel fell, and the Twenty-seventh Annual Meeting of the Ohio State Medical Society was declared adjourned to meet in Columbus, on the second Tuesday in June, 1873.

[Portsmouth, situated in a broad valley and surrounded by beautiful hills, with her genial, hospitable citizens, will long be remembered by all those in attendance upon the meeting just closed. From the time we stepped upon her wharf until the steamer, which was to bear us home, left her shores, nothing but cordial hospitality greeted us on every hand. Not a jar, not a discordant sound, not an unpleasant thing to mar our remembrance of her and her citizens occurred during our stay of three days within her limits. J. W. H.]

W. W. DAWSON, *President.*

J. W. HADLOCK,
W. J. CONKLIN, } *Secretaries.*

ANNUAL ADDRESS

OF THE

RETIRING PRESIDENT,

W. W. DAWSON, M. D., CINCINNATI, O.

ANNUAL ADDRESS

OF THE

RETIRING PRESIDENT,

W. W. DAWSON, M. D., CINCINNATI, O.

I propose to occupy this hour of your time with a few reflections upon the American Profession to-day in comparison to what it was twenty years ago; especially do I wish to contrast the teaching of the present with that of the past. Annual addresses, both state and national, are very much the same; so alike are they that the antiquarian in looking over them will imagine them written by the same hand—dictated by the same brain. They all eulogize the honor, the dignity, the divinity-kinship of the Profession, but deplore at the same time the want of a high *esprit de corps* among its members, the fearful ignorance of medical students, and the great defects of medical education. To hear these railers you would think we are in a most deplorable condition.

As this has been so general, I think I will be excused from departing from a custom so long and so faithfully, if not profitably, observed. It may profit us to look at physi-

cians as they are; at medical students as we see them scattered over the land teaching country schools; as we find them grouped in medical colleges; and at the manner and success of medical teaching.

Physicians form a large body of men, everywhere needed everywhere present, in village, town and city. In character, standing and influence they are in advance of any other class. Here and there an unworthy one is found, but the great mass of them are men of temperance, integrity and high moral worth. They lead in works of benevolence; they respond to the call of humanity; they leap to the front when their country is in danger; they are identified with all efforts for the development of man's physical, moral and mental nature. Among themselves an *esprit de corps* characterizes their intercourse, to which all other avocations and professions are strangers; an *esprit de corps* which, in its high tone, in its utility for protection and defense, in its ability to generate and maintain the kindliest relations between its members, is a marvel and a wonder to the non-professional.

Who are the medical students found yearly in our medical colleges? They are young men gathered, in large proportion, from country school houses. Many of them have graduated at literary colleges; most of them have fair educations, and in a very large number of cases the education is the result of individual effort. It is from this class of self-developed young men that have come the physicians of to-day, and from these physicians have arisen the men who give distinction to all departments of medicine. I say dis-

tinction, for in many respects the physicians of America are the peers of their fellows in any land.

It will not be inferred that I underrate in the student the advantages of a thorough classical education. What I mean to say is that the profession is in better condition than could be inferred from our annual orations on the defects of medical education, and what I hope to prove is that the real defects are gradually being remedied, and that in time, and in a very short time too, medicine here will be as well taught, and students will be of as high character as in any place on this globe. The marvel is that as much has been accomplished as has, when we look at the history of the country and the early surroundings of most medical men. Surmounting all difficulties, overcoming all obstacles, by hard study making up for the deficiencies of thorough early training, the American physician to-day stands abreast with the most distinguished; he brings his achievements, his successes, his improvements, and his discoveries and places them by the side of those gathered by the sons of more favored lands; these achievements, these discoveries, though probably not so numerous, are equally positive, equally meritorious, are, in fact, great contributions to medical science.

The reforms insisted upon by those who dwell upon the defects of our system of medical education, consist of three recommendations: first, a higher standard for the Doctorate. Second, longer sessions. Third, graded studies. These are important suggestions, and fortunately for all parties, the faculties of medical colleges have generally been alive to them, and, as I have already said, I hope to show that the radical defects of medical education are gradually but stead-

ily being remedied, that sessions are gradually being lengthened, that lectures with this increase of session necessarily become graded, and that the Doctorate yearly advances in worth, honor and dignity. This advance is as steady and faithful as it is desirable.

In proof of what I have said, let us look at our colleges, the time and manner of teaching, the qualifications of the young men who come to be taught, and who, in the end, receive the degree. In most of our colleges, in all I may say, the length of the session amounts to six months—formerly it was but four, then it was increased to five—now, however, with a preliminary course in September, which a large portion of the class attends, the session is in reality six months long. In less than half a decade, the introductory in all colleges to the regular course will be delivered on the first Monday of September, and the valedictory on the corresponding day in March. The times demand the advances—the colleges will undoubtedly make them. Already gradation in studies has been adopted by one leading college, and its example will be followed by others. The graded teaching as established at Harvard can be markedly improved upon. In many respects it is better than the old system of repetition, in some it is not so good, still it is a step in the advance, and as far forward as the circumstances would justify.

If you compare the manner of teaching now with what it was forty years ago, or even twenty, the improvements will be as marked as they are hopefully inspiring.

Take Anatomy, the basis of the whole structure; twenty years ago the Bones and Muscles occupied almost the whole

course; these, with a few, and a very few, lectures on the Viscera, Arteries and Nerves, were all that were vouchsafed to the student. Now most schools have two professorships devoted to Anatomy—one to Anatomy proper, the other to Surgical Anatomy. Wilson inaugurated a new era in the teaching of this important branch; he brought form out of chaos; he showed how to teach anatomy by teaching the relations of various parts to each other, and faithfully and profitably have the anatomists of the whole world followed his example. Now, when a student leaves his college, he knows more than the origin and insertion of a muscle; more than that an artery is a branch of the aorta; more than that the stomach is in the abdomen. He is taught the situation and topography of the organs; the relationship of the various parts. He knows where to cut to divide a muscle; he knows where to seek for an artery. I do not overstate the fact when I say that the present intelligent and efficient manner of teaching anatomy, in comparison to the past, is as light to darkness.

Think for a moment how Chemistry was taught twenty years ago, and how it is taught to-day. Then the whole ante-holiday part of the session was devoted to the fearful Imponderables. In the last half of the term, somewhat of Oxygen, Carbon, Nitrogen, Hydrogen, Alkalies, Acids and Salts was discussed. Medical Chemistry was not reached; the analysis of the secretions and excretions did not enter into the list of what was regarded as essential in a medical man's education. Now, however, the graduate, if he has been diligent, is master of these subjects; at least he has been so instructed that he has all the elements of success.

He is drilled in urinalysis; he knows how to examine sputum; he can detect poisons and furnish the antidote for them; in fact, he is, or has had the opportunity to be, thoroughly competent to do all those things in Medical Chemistry required in the intelligent practice of his profession.

In Materia Medica, one of my Professors read from dingy, smoky manuscript that had seen service for twenty years. Once in a while—and a long while—a fresh scrap of white new paper could be seen interleaved with the yellow veterans. Now and then a specimen of plant or of earth or of mineral was presented. The dryness, the dullness, the want of interest in that course is not easily forgotten. In Therapy, the student was regaled with learned disquisitions on the fluids and solids, and the action of medicine upon them. If a man twenty years old in his profession will enter the room of the Professor of Materia Medica and Therapeutics of to-day, he will be struck with the change. By throwing out the hundreds of useless agents and confining himself to the essentially valuable, by an intelligent discussion of their qualities, uses and indications, by a philosophical estimate of their actions, by an accurate knowledge of the parts of the body upon which they exert their influence, the Professor makes this department one of the most interesting and captivating to the student.

Pharmacy is the legitimate offspring of an advancing, demanding spirit in the profession. Compare the elegant preparations of our pharmaceutist with the villainous compounds which were prescribed a few years ago; our patients, if not ourselves, have great cause for felicitation.

Perhaps in no department has twenty years made such

striking changes as in the teaching of Physiology. At that time, in most of our schools Physiology was appended to the chair of Anatomy, and positively received no attention at all. In some schools a seventh chair was added, called the Institutes of Medicine; this embraced, or should have embraced Physiology and Pathology. One of the schools which I attended had a Professor of the Institutes; he was called a "Giant in Physiology." This Giant spent a large portion of his time in teaching us Phrenology and Mesmerism; occasionally he relieved the tedium of these twin sciences by a lecture on Vital Forces. Another Professor in this department lectured from manuscript, from which he seldom raised his eyes. These Giants had both been educated abroad, and taught Physiology as they had learned it. Now the student is taken into the laboratory and taught the functions of the body by experiment—by vivisection. The gastric fistula by which digestion can be watched and estimated, is now not an uncommon spectacle in our medical colleges. The functions of the nervous, lymphatic and glandular systems, the part which the great organs take in the animal economy are demonstrated with remarkable exactness.

When we reflect on the manner and success of teaching the elementary branches, Anatomy, Chemistry, Physiology and Materia Medica of the present in comparison to what it was a quarter of a century ago, we can not but be struck with the hopeful contrast, and we must admit that with all the defects of our system of teaching that it is, all things considered, equal to any other department of science or letters in our new and developing country.

This brings us to a review of the present manner of teaching the practical branches, the application of the elements. And first, I may say that almost everywhere in our country, Didactic and Clinical instruction go hand in hand. The importance, the absolute necessity of the union, seems to be recognized by all. To Cincinnati belongs the honor of first uniting in this country a College and Hospital. Dr. Drake was the author of this system, and from this initiative have grown results of the most lasting benefit. Colleges and hospitals are now most intimately associated, not usually made one and the same institution, as was projected by Dr. Drake, but so associated as to make the Clinics of the Hospital complementary to the Didactics of the College. But few schools are to be found without a College Dispensary at which students are trained in diagnosis and treatment.

The chair of Gynæcology has been added in most of our Colleges, thus rendering the instructions upon the diseases of women much more thorough and practical than was possible under the old régime. The diseases of the uterus, its degenerations, malignant and non-malignant, its changes of position and shape, its intimate relations with and modifications of its neighborhood, furnish subjects for a full course of lectures, the vital importance of which need not here be discussed.

In the Practice of Medicine, the student is no longer sent away with theories and prescriptions; educated in the pathology of disease, daily drilled in its diagnosis, he goes easily to the best remedies for its treatment. Physical Diagnosis is not old, but the last ten years has added very greatly to its exactness, to its reliability. The use and value of the

Stethoscope is rendered familiar to the student, because at the bedside he is taught the interpretation of the sounds transmitted through it. He knows when he leaves his Alma Mater what this means at the base, and what that means at the apex. Thermometry, now so important an adjuvant in revealing the vital condition, is taught in the same practical manner. The Sphygmograph, a refinement in diagnosis, is presented if not estimated. I think it would be difficult to find a medical student of two years of age who could not tell you when and how to use the Induced Current, and in what cases the Continuous Current is applicable. In the application, if not in the literature of this great remedy, we are certainly not behind the most advanced.

Added to the curriculum of study almost within the last ten years, we have the two departments of Ophthalmology and Otology. Of very great practical value in themselves, the thorough study of them often throws much light upon questions of general pathology. It would be difficult indeed to overestimate the advantages which the student now possesses in investigating the diseases of the Eye and Ear.

When we come to review the present with the past of Surgery, we may say that in America, Surgery has always been well taught, and the world knows how successfully it has been practiced. The achievements of American surgeons furnish among the highest adornments of our history. With what pride we constantly refer to the triumphs of such men as McDowell, Dudley, Mott, Physic, Mussey and Blackman. Europe as well as America is filled with the renown of many of our leading living Surgeons. The Europeans read their books, discuss their papers, use the

instruments of their invention, admire and adopt many of their original operations. The Foreign Surgeon when criticizing American surgery is generally just—sometimes unjust—occasionally ungenerous. The following paragraph from the recent valuable work on the "Science and Practice of Surgery," by Frederick James Gant, belongs to the latter class. In discussing the history of Ovariotomy, he says: "Extirpation of ovarian tumors, cystic or solid, is an operation of comparatively recent date suggested by Dr. Wm. Hunter, advocated by John Bell, and first practiced by Dr. McDowell in 1809, the latter an American pupil of John Bell. Ovariotomy is, therefore, unquestionably an operation of British origin, and it is to the labors of British surgeons that its subsequent progress is chiefly due." Mr. Gant is somewhat more accurate than his neighbor, Mr. Butcher, of Dublin, who in a late article attributes to Mr. Lizars, of Scotland, the credit of having first performed the operation. Mr. Lizars cut into an obese woman in 1823, but found no ovarian disease, while Ephraim McDowell, of Danville, Ky., performed Ovariotomy successfully in 1809. His patient lived for years after. How absurd and unjust in Mr. Gant to claim the honor of this great operation for British surgery when we remember that Great Britain never had a completed case until 1840, nor a successful one until 1842, and especially as up to that time, the operation had been performed in America more than forty times.

This pioneer operation of Ephraim McDowell may justly be regarded as the most daring feat in the history of surgery. Imagine his surroundings, in the "backwoods" of Kentucky—in 1809 it was indeed a backwoods, full yet of In-

dians and wild animals—there, in that almost unbroken wilderness, with no counsel, no support, he not only conceived, but successfully performed that wonderful operation. Realize if you can the intrepid heart and force of brain of that early American surgeon as he made the first incision in that case, as he progressed in that operation—an operation hardly thought of, occasionally suggested, but never really advised. Picture if it be possible the surroundings of that man, and then you may have some idea of his great knowledge, his wonderful nerve and his unequaled self-reliance.

Benjamin Dudly was as successful in Lithotomy as is Sir Henry Thompson to-day with his selected cases of Lithotrity.

American surgeons have taught the world that Vesico-Vaginal Fistula is almost always remediable. They did not originate the operation, but they have shown how it can be successfully performed, and that, too, under the most unpromising complications. You will realize the truth of what I say when I tell you that a colleague of mine, during a recent visit to Europe, witnessed the treatment of a case of Vesico-Vaginal Fistula in an Irish Hospital by the daily application of Nitrate of Silver. The tide of surgical students might with profit be reversed. Such Hospital Surgeons could learn something, could indeed learn much, by visiting this country. The relief of one case of Vesico-Vaginal Fistula is worth a whole lifetime of labor, it is a diadem in the crown of a surgeon, and I am proud to say that most American Surgeons have a number of these jewels.

Pulleys and Adjusters have given way to manipulation in the reduction of dislocations; the key to this was furnished a few years ago by a New York surgeon. What a revolu-

tion in the treatment of fractures we have made by elastic extension and sand bags. The surgeons of all countries read Dr. Hamilton's book on "Fractures and Dislocations." They read it because it is the best book in any language. For the general practitioner what work can be compared to Gross' System of Surgery.

A new era has dawned in the treatment of joint diseases, especially disease of the hip, and it is doubtless true that the most valuable contributions are due to the learning and skill of New York surgeons. Where except in this country do you find Morbus Coxarius so treated as to secure complete use of the limb and joint?

I might extend this list of American contributions to surgery very greatly, and with instances equally striking as those already presented, for it can not be denied that in surgery we have given as much as we have received. And here I may make the pertinent inquiry, if our system of medical education be so defective, why this great excellence in the men who have been educated by it? It is unusual to see such fruit from a tree that is all unsound.

The annual examination for the degree of Doctor of Medicine in most of our colleges is now made by written questions and written answers; thus a better knowledge of the student's ability is obtained than by a thesis written in his own room, with books and his room-mate or some medical friend to draught upon. The plan is essentially the same as that adopted in Great Britain in the examination for Degrees, License, for Hospital Interne, and entrance into the Army, Navy or India service. And now let us look for a moment at the questions presented in this country and in

Europe. For comparison, I take those given by the Staff of the Cincinnati Hospital at the last examination for Internes, and those adopted by the Faculty of one of our Colleges at a recent examination for the Degree. I use the questions of these two institutions because I happen to be in possession of them—I have no doubt, however, but that they are fair types of those used in most of our colleges and hospitals.

Questions submitted to the Candidates for the position of Interne in Cincinnati Hospital, 1872.

OBSTETRICS.—1. Name the positive signs of pregnancy. 2. What presentations are unnatural, requiring interference? 3. Where the face presents, what relation must its long diameter sustain to the inferior strait for safe delivery? 4. How is assistance to be rendered when the presentation is distending the perineum? 5. Where and how soon should the funis be tied after the expulsion of the fœtus? 6. What are the signs of placenta previa? 7. Name the displacements of the uterus. 8. Name the symptoms of prolapsus uteri. 9. How would you treat dysmenorrhœa? 10. How would you treat amenorrhœa?

OPHTHALMOLOGY.—1. How would you treat foreign bodies lodged in the cornea? 2. Give a differential diagnosis of simple conjunctivitis and iritis. 3. What is accommodation, and how is it effected? 4. What is the difference between presbyopia and hypermetropia. 5. What nerves supply the muscles of the eyelids and eyeball? 6. Give the diagnosis, course and treatment of ulceration of the cornea. 7. Give the diagnosis and symptoms of cataract. 8. Describe the treatment of diphtheritic conjunctivitis in its three stages. 9. Give the diagnosis and treatment of acute granulations. 10. Describe the different methods of operating for entropion of the lids.

SURGERY.—1. In strangulated hernia what difference in the direction of the division of the strictures is necessary to avoid the internal epigastric artery in cases where that stricture is at the internal ring, and in others where the stricture is at the external ring? 2. What is the condition of the skin in eczema, the pathological products of that disease, and its chief symptoms? 3. Name the common forms of gangrene? 4. What effects may be obtained from poultices, and mention

some of the conditions indicating their use? 5. What lesion of the alimentary canal is apt to occur in cases of burn? 6. At what point is the clavicle most frequently fractured? state the symptoms indicating such injury, and what are the chief indications in the treatment? 7. At what portion of the urethra is stricture most frequent? 8. State the chief characteristics of the initial lesion or sore of syphilis, and those of the soft sore or chancroid respectively. 9. What is Hunter's method of ligature of arteries for aneurism, and the principle on which it is based. 10. Mention different means for the arrest of hemorrhage.

PRACTICE OF MEDICINE.—1. What is your method of taking the clinical history of a patient? 2. How do you distinguish between pleuritic effusion and consolidation of the lung from pneumonia? 3. Give the diagnosis and treatment of pericarditis. 4. What pathological conditions may produce dropsy? 5. How would you proceed to investigate a specimen of urine? 6. On what different pathological conditions may Bright's disease depend? 7. What conditions may produce hemiphlegia? 8. What is the difference between dysentery and diarrhœa? 9. What causes may produce obstinate constipation? 10. Give the symptoms and treatment of delirium tremens.

PATHOLOGY.—1. Origin of pus corpuseles. 2. Pathology of thrombosis. 3. Pathology of embolism. 4. Minute anatomy of healing by granulations. 5. Pathology of miliary tubercle. 6. Pathological characters of a malignant as distinguished from a benignant tumor. 7. Morbid anatomy and pathology of cerebral hemorrhage. 8. Pathology of cardiac hypertrophy. 9. Pathology of aneurism. 10. Morbid products in pleurisy and the manner in which they are disposed of.

The following questions, ten in each department, were submitted to the graduating class of 1872 *in the Medical College of Ohio.*

ANATOMY.—1. Give a general description of the skeleton. 2. Describe the os femoris. 3. What are the essential components of an entirely movable joint? 4. Describe the elbow joint. 5. Describe the heart. 6. Give its position. 6. Describe the larynx. 8. Describe the trachea, bronchi and bronchia. 9. What are the enveloping membranes of the cerobro-spinal axis? 10. What are the great divisions of the encephalic mass, and their relation?

SURGICAL ANATOMY.—1. What is the best place for ligating the common carotid artery, and what are its relations at that part? 2. Popliteral artery, where found and relations? 3. What are the anatomical objections to ligating the first and second portions of the sub-

clavian artery? 4. Scarpa's triangle, boundaries and important parts contained. 5. By what muscles is the inner border of the foot elevated? 6. Fractures in upper third of radius, in what position best treated and why? 7. What are the parts divided in the lateral operation of lithotomy? 8. Surgical anatomy of the shoulder joint. 9. Surgical anatomy of the elbow joint. 10. Surgical anatomy of the hip joint.

PHYSIOLOGY.—1. The digestive juice with the widest range of action, and its chief ingredients? 2. Trace fat through the system. 3. The cause or causes of circulation in the veins? 4. Capillary circulation, continuous or intermittent, in either case why? 5. Chief use of the red blood corpuscles? 6. Uses of sweat? 7. The immediate and subsequent effect of wounding the cerebellum? 8. The diurnal range of temperature and the variations compatible with health? 9. The necessary quantity of air in cubic feet for twenty-four hours? 10. Describe a spermatozoid.

CHEMISTRY.—1. Enumerate the general properties of acids and bases. 2. Give the composition, formula, and mode of preparation of hydrochloric acid. 3. Describe the tests for arsenic. 4. What is the antidote to arsenic and how prepared. 5. Describe normal urine. 6. How is urea obtained from urine? 7. How are chlorine, sulphuric acid, potassium and sodium detected in urine? 8. Describe the tests for sugar in urine. 9. How would you determine whether a deposit consists of urates, phosphates, oxalate of lime or uric acid? 10. How would you discover blood in urine?

SURGERY.—1. What are the various processes by which fractured bones unite? 2. What are tne means you would use for strangulated hernia before resorting to an operation, and, failing in these, what are the operations recommended, and the advantages of each? 3. In what injuries of the ankle joint is deformity inevitable? 4. What are the stages of hip-joint disease, and the treatment of each stage? 5. How would you treat wounds of the stomach? 6. What are the indications for amputation? 7. Describe the various methods of acupressure. 8. Differentiate between intra and extra-capsular fracture of the neck of the femur. 9. Differentiate between abscess, encephaloid, aneurism, hernia and adenoma. 10. Name the principal disease which affects bones.

PRACTICE.—State the prominent facts in the clinical history of malarial fevers. 2. What is the cause, course and termination of hepatic abscess? 3. What are the symptoms and dangers of desquamative nephritis? 4. Diagnosis between real and feigned epilepsy. 5.

How treat habitual constipation? 6. What are the physical signs of pericarditis? 7. Diagnosis between peritonitis and enteritis. 8. How distinguish fixed neuralgia from inflammatory pain? 9. Give the dry and moist rales; what do they indicate? 10. How would you treat cardiac hypertrophy?

GYNÆCOLOGY.—1. Describe the uterus; location, size, weight, division, structures. 2. In what particular does the neck of the womb differ from the body of the womb? 3. Describe ovulation and menstruation. 4. What circumstance would enable you (if possible) to determine the difference between specific and non-specific vaginitis? 5. Mention the most common diseases of the uterus in the order of their frequency. 6. Name the various substances that may be expelled from the female pelvic organs. 7. Give the probable and positive evidences of the existence of uterine cancer. 8. Mention the forms of dysmenorhœa and differential diagnosis. 9. What are the conditions capable of producing amenorrhœa? 10. What are the diseases which may produce pelvic abscess?

OBSTETRICS.—1. Give positive signs and duration of pregnancy. 2. Give diameter of pelvis at brim and outlet. 3. Give diameters of fœtal head. 4. Describe the anterior and posterior lateral inclined planes, and their relations to the mechanism of labor. 5. Give the four cranial presentations, with the diagnosis of the first. 6. Management of natural labor. 7. Under what circumstances would you turn, and how? 8. Cause, symptoms and treatment of unavoidable hemorrhage. 9. Cause and treatment of post-partum hemorrhage. 10. Symptoms and treatment of puerperal convulsions.

OPHTHALMOLOGY.—1. Name the bones that form the orbit. 2. Name the muscles found in the orbit, giving the nerves that innervate them. 3. Giving a case of internal squint, how could you tell whether it was paralytic or not? 4. Give the condition of the lids in ptosis and facial paralysis, with the muscles and nerves involved. 5. Give the structure of the eye from before backwards. 6. Give the points of differential diagnosis in the various conjunctival inflammations. 7. Differential diagnosis of iridal and corneal inflammation, with the general plan of treatment in the latter and the particular of the former? 8. Of what does the lachrymal apparatus consist, and what may interfere with the carrying off of the tears? 9. What is a cataract, and what is its treatment? 10. What are the two methods of examining the eye with artificial light?

MATERIA MEDICA.—1. Why is cod liver oil the best form in which to administer a fat? 2. Describe the effects of arsenic on the primary

assimilation. 3. Name the preparations of arsenic, and the dose of each. 4. Give the composition of opium. 5. What is the treatment of opium narcosis? 6. What practical test for the purity of chloroform may be made at the bedside? 7. In danger from chloroform narcosis what methods of resuscitation are proper? 8. What is the distinction between Galvanism and Faradism? 9. To what class of cases are these two forms of electricity especially applicable? 10. Write a prescription for a purgative pill.

Questions at the examination of Candidates for the English Indian Medical Service.

ANATOMY AND PHYSIOLOGY.—1. Give a general description of the spinal column, and of the course of its ossification. 2. Describe the mode of development of a vertebra in general, indicating the exceptional cases, (exclusive of the sacrum and coccyx.) 3. Enumerate the various muscles and describe their respective functions, by which the deformity witnessed in the following fractures is probably caused: 1st, Fracture of the neck of the femur; 2d, Fracture of the lower end of the femur immediately above the condyles; 3d, Fracture of the lower end of the radius, (Collis's fracture.) 4. Describe the arch of the aorta, the relations of its various positions, and the dissection necessary to examine it; mention also the principal variations in the positions of its branches. 5. Describe the parts contained in the space bounded in front by the posterior border of the sterno mastoid, behind by the anterior border of the trapezius, and below by the clavicle. 6. Give a general account of the lymphatic and lacteal system, including the minute structure of the lymphatic vessels and glands. 7. Describe the physiological effects of the division of the vagi nerves. 8. Mention the parts in other vertebrate animals which are homologous with the human hand or parts of it.

SURGERY.—1. Describe the states named respectively "shock" and "reaction" as seen in such a case as that of a crushed limb. 2. Enumerate the chief varieties of inflammation of the testicle, and state the distinctive characters of each. 3. Give an account of secondary hemorrhages such as may occur after amputations, and of the best modes of treating them. 4. What ill consequences may follow dissecting wounds, and what are the best means of treatment, preventive and curative? 5. What are the chief means by which in the treatment of hernia the taxis may be assisted, and in what conditions is each of them most useful? 6. Describe the process of repair of a tendon after subcutaneous section. 7. Describe the several diseases

of the eye that are connected with syphilis and gonorrhœa. 8. A man fifty-three years old, while under treatment for slight stricture of the urethra, was exposed to cold, damp weather; the next day had a severe rigor, followed by heat and sweating, and completely lost the power of passing urine. On each of the next two days he had similar rigors, and on the third day he was not only still unable to pass urine, but had constant straining and extreme pain in his endeavors to do so. During three days more these symptoms continued, with rigors, and there were gradually added to them pain in the perineum and about the arna, tenderness on deep pressure in front of the anus, and heavy forcing pain referred to the lower part of the rectum. The bladder was regularly emptied with a catheter and was not painful on pressure; the urine was generally healthy. Diagnose this case and give treatment.

Questions submitted to Candidates at the primary examination for the Diploma of Membership of the Royal College of Surgeons, London.

ANATOMY AND PHYSIOLOGY.—1. Describe the boundaries of the posterior mediastinum and its contents in their relative position. 2. Describe the structure of veins, and the forces by which the venous circulation is carried on. 3. Describe the ligaments of the hip joint, and mention the muscles in contact with its capsule. 4. Give an account of any experiments with which you are acquainted illustrating the influence of the pneumogastric nerve upon the action of the heart. 5. Describe the ligaments connecting with the clavicle, and mention the parts that pass beneath it in their relative positions. 6. Describe the ciliaris muscle and its action.

SURGERY AND PRACTICE OF MEDICINE.—1. How would you distinguish, surgically, chronic induration of the breast from scirrhus? What are the microscopic appearances by which each is characterized? 2. Describe the operation of excision of the elbow joint, and state under what circumstances it may be required. 3. What treatment would be required in a case of incised wound of the cornea, with protrusion of the iris? Mention the consequences which may ensue, and the proper mode of dealing with them. 4. What are the causes which may impede the union of a fracture of a long bone? Describe the mode of treatment which might be resorted to in order to promote the union of an united fracture. 5. Describe the deligation of the right carotid artery in the first part of its course, giving the exact relations of the parts concerned in the operation. 6. Mention the different forms of nævus and appropriate modes of treatment. 7. De-

scribe a case of paralysis of the facial nerve, and mention the causes upon which it may depend, and the treatment you would adopt for its relief. 8. What are the circumstances which would induce you to have a recourse to thoracentesis in a case of effusion in the pleural sac, state how you would perform the operation, and the changes that would follow it. 9. Write prescriptions in Latin in full, and directions in English for a diuretic mixture and a purgative powder, and give composition and doses of the following preparations: Pulvis Jalapæ Composita; Mixtura Ferri Composita; Tinctura Camphora Composita; Liquor Morphia Hydrochlor.

In the exhibition of these questions I trust I have not been tedious. I have ventured upon them for herein lies the argument, we see by them that our schools and hospitals take as wide a range and ask as difficult questions as is done by examining bodies elsewhere. These questions show the extent of teaching, and it will not be contended that a young man who answers seventy per cent. of them is not well educated. The lesson of this whole matter is, that the Profession in this country is not in as bad condition as would be inferred from these periodical complainers.

In Medical Literature America certainly stands well; our books are read in all countries. In Surgery, Medicine, Therapeutics, Physiology, Chemistry, Obstetrics, Gynæcology, our authors have won well-merited fame. Our Medical journals are yearly by their merits challenging recognition. It is said that they contain much trash; this is true, but it is equally true of foreign periodicals. It is not all wheat within the lids of any medical work, unadulterated wisdom is not found in medical journals; I do say, however, that brains predominate in our medical literature.

Thus by the steady advance in the manner and efficacy of teaching, by the yearly improvement in the preliminary edu

cation of students, by the increase in the length of the lecture term, and what is still better than all, by an enthusiastic love of the profession, our Medical Colleges will annually send out a class of young men from whom may be expected the best of things; many of them will take high rank, and distinguish themselves in fields where distinction is the result of true worth.

NERVOUS INFLUENCE.

S. S. SCOVILLE, M. D., LEBANON, O.

Report on Nervous Influence.

BY S. S. SCOVILLE, M.D., OF LEBANON, OHIO.

Heathenism in its blindness could not contemplate nature as a whole. One phenomenon had no tangible connection with another. The manifestation of power as observed in clouds, the wind or the rain, was regarded as a force ordained in some inconceivable manner to preside over that particular thing. The want of ability to perceive connections, or to trace cause and effect as operating through a succession of occurrences, led to Polytheism. When the special force or power became personified and worshiped, Paganism, which so long fettered the human mind, was fully initiated. But, nevertheless, the understandings of men became enlightened; the dark Fraunhoferan lines that marked the boundary between phenomena were interpreted, and thought penetrated deeper and deeper from the circumference to the center—from diversity towards unity. But the range of the keen eye of the scientist was limited. It needed supplementary lenses; these were supplied, and the true conception of universal forces in nature resulted. In

the fullness of time, through the labors of such minds as Rumford, Mayer, Faraday, Grove and Tyndall, the great truths had their birth.

If, as is now held by the most advanced physicists, the forces of nature when traced through all their manifestations are found to culminate in unity, and belong as much to inorganic matter as to organic, an opportunity is afforded of studying the functions of living forms without being constantly under the necessity of invoking that physiological trinity, the *egg*, the *frog*, and *St. Martin's stomach.*

In viewing the various parts of the higher order of animals, we find, as it were, "many in one." That is, each organ or part of an organ seems to resemble, in structure as well as in activity, some complete form found lower in the scale of life. And, were we to analyze some complicated piece of human machinery, and acquaint ourselves with its full history, we might find that the various parts of which it is composed once existed as distinct simple machines, which served various purposes in the arts, long before they were united or co-ordinated into a single machine. But in combining these simple pieces of mechanism in order to a co-ordination of motion, there must be improvised certain connecting media. These bands, bolts, pipes, cogs, pins, or whatever they may be, are essential to the motion of the machine as a whole. In the animal machine we find the same media brought into requisition, and even these structures may have been typified in some pre-existing forms.

The molecules and cells which are found in man, where diversity of structure, and consequently function, have culminated to the highest degree of unity or co-ordination yet

attained, do not exhibit strange and peculiar actions in consequence of their exalted position. Their activity may be increased or diminished in consequence of the new relation, but they preserve the same uniform mode of motion that they had in their low estate, from whence they may have been derived. We have reason to believe that all the force or motion displayed by the most complicated organism is but the accumulative energy of these molecules and cells, acting through certain devised instrumentalities. Albinus regarded motion as the essence of vitality; and so far as reason and experiments have been able to penetrate this most wonderful subject, there has not, perhaps, been a better definition given. Of the nature of motion in the abstract, we know comparatively nothing. Our conceptions of motion are formed from its relativity. To perceive motion in a body, some other body or object must be perceived at rest or moving with a different velocity, either in the same or in an opposite direction. Whether vitality consists in motion or not, we know that it is inseparable from it.

With these general remarks, by way of introduction, we are brought more directly to the consideration of our subject. The nervous system is so completely blended with the whole animal fabric that it becomes difficult, if not impossible, to acquaint ourselves with its functions without considering it in its various relations; and more especially in its relations to the muscular system, through which its manifestations are so conspicuous. So intimately are these two textures united, that the phrase "nervo-muscular system" is brought into frequent and appropriate requisition.

In form and general appearance, the muscles have but

little resemblance to nerves, but in their material composition we find a similarity such as to account for the close relation of functional energy found operating in them. In both textures the matter is in a very unstable condition—subject to ready change or transformation. The nervous centers we know are, in a great measure, composed of cells, which are not only connected with each other, but have certain connections with the nerve fibers which pass off to other structures; the motor fibers connecting in some manner with contractile tissue. With all the true nerves there is a similarity in their construction, each fiber having its axis-cylinder surrounded by the white matter of Schwann, which is inclosed by a membrane. In its entire course, each fiber remains distinct from its neighbor, there being no arrangement, so far as discovered, for the influence to be propagated except in a direct manner *to* and *from* the nervous centers.

In the construction of muscles (striated) there is, seemingly, an arrangement by which the motion or influence coming through a nerve may be propagated in a transverse as well as in a direct manner. Each fibrilla, it will be remembered, presents light and dark parts, "which alternate at intervals exactly corresponding with the distances of the transverse stria in the fiber." By this arrangement, the fiber, which consists of a bundle of fibrillæ, when deprived of its sarcolemma, may be made to separate transversely into plates or disks. It would not be unreasonable to suppose then that the nerve force upon reaching a fibrilla propagates itself laterally, thus affecting an entire disk, and that the disk affects its neighbor, and so on, causing their approx-

imation, thus accounting for those waves of contraction observed by Aeby and others.

We have, perhaps, an illustration of the workings of the nervo-muscular apparatus in the electric telegraph. The motion liberated from the cells of a battery is conducted through a wire, to the farther end of which is attached a certain instrument which exhibits visible motion. The influence or motion as it passes through the conducting wire we call electricity; that which operates in the instrument is termed magnetism. Just how the change in the mode of motion is effected, we shall not stop to consider in detail; suffice it to say that the *conditions* are changed. The instruments through which the current is propagated are differently constructed. The electricity upon entering the helix has a different direction, and such a relation to certain matter as to have an inductive influence, and finally causing an approximation of two pieces of metal, which may be regarded as *contraction* when these pieces are considered as constituting or as belonging to one instrument.

In the electro-magnetic coil, the same as in a muscle, we have molecular motion aggregated into mechanical.

In considering nervous action as observed in the motor system, we find at the extremity of the afferent nerve a peculiar arrangement by which motion of some kind is liberated, transmitted and given up to a nerve-center, which may respond to this influence by liberating motion to be conducted through an efferent nerve to a muscle, where motion is expended in mechanical energy, it may be, upon the same object or body which first excited or caused it in the efferent nerve. A body may be forced against some

part of the person, causing pain or some inconvenience; the hand pushes it away. This simple process may be regarded as action and reaction between two points, the objective and subjective. And were we to consider all the phenomena of force or motion as concerned in the correspondence between the outer and inner relations of animal life, we should find that they are resolvable into some form of *action* and *reaction.*

As it regards impressions made upon the periphery of a nerve, whether of special or general sensation, they result from some kind of dynamical force or energy. The auditory nerve we know is affected by sound waves propagated through the air. Their force, however, will not excite the nerve if they fall short of or exceed a certain amplitude. Noise, it is said, is produced by an irregular succession of sonorous shocks, while musical sound may be produced by *taps* or *puffs* which rapidly and regularly succeed each other. The more rapid these taps or puffs, the higher the pitch or tone. The human ear is limited in its range of appreciating musical sounds. Vibrations numbering less than sixteen a second appear as separate shocks; when they exceed thirty-eight thousand a second all consciousness of sound ceases. Hence the range of the most acute ear is about eleven octaves. In music, the sounds available are produced by vibrations comprised between the limits of forty and four thousand a second, or seven octaves. (Tyndall on Sound.)

The discovery of the true nature of the propagation of sound in air, led to that of light in ether; and although the vibrations of ether waves in the case of seeing are infinitely more rapid than the air waves in hearing, yet in both cases it is dynamical force or motion that originates the impres-

sions which are transmitted through the nerves to the brain, and there translated in some inconceivable manner into light and sound. The eye, in the perception of light, has a range scarcely exceeding a single octave. In the *red* ray we have the lowest rate of vibration which the optic nerve of the human eye can appreciate. Then in ascending the scale we have the *orange, yellow, green, blue, indigo, violet* and *ultra violet,* beyond which the vibrations in rays emanating from luminous bodies become too rapid to be recognized. It is but a fraction of the rays in the spectrum that can be rendered available for sight by the optic nerve.

According to Meloni, vision seems to consist in a certain relationship existing between the optic nerve and the oscillating periods of luminous bodies. The language of Tyndall (lecture on Radiation) is: "The optic nerve responds, as it were, to the waves with which it is in consonance, while it refuses to be excited by others of almost infinitely greater energy, whose periods of recurrence are not in unison with its own." The same relationship seems to exist between the auditory nerve and sound waves. Tyndall, in treating of sound, after speaking of the *elastic bristles* of Shultze, and the *otolithes,* observes: "Finally, there is in the labyrinth a wonderful organ, discovered by Corti, which is to all appearance a musical instrument, with its chords so stretched as to accept vibrations of different periods, and transmit them to the nerve filaments which transverse the organ. Within the ears of men, and without their knowledge or contrivance, this lute of three thousand strings has existed for ages, accepting the music of the outer world, and rendering it fit for reception by the brain. Each musical tremor which

falls upon this organ selects from its tensioned fibers the one appropriate to its own pitch, and throws that fiber into unisonant vibration. And thus, no matter how complicated the motion of the external air may be, these microscopic strings can analyze it and reveal the constituents of which it is composed."

For the number of strings in this instrument Tyndall refers to the researches of Kolliker.

Huxley, (Elementary Lessons in Physiology,) while speaking of the ear, says: "The *scala media* resembles a key-board, in function as well as in appearance; the fibers of Corti being the keys, and the ends of the nerves representing the strings which the keys strike." "If it were possible," he continues, "to irritate each of these nerve fibers experimentally, we should be able to produce any musical tone at will in the sensorium of the person experimented upon, just as any note on a piano is produced by striking the appropriate key."

With the sense of Smell, the nerve seems to have its range in the recognition of odorific emanations from bodies. Only those particles whose size, or periods of oscillation, it may be, which fall within certain limits, are capable of affecting the nerve. In order to perfect olfaction, the particles must be made to impinge upon the membrane with some degree of force. They may collect upon the membrane in such a gentle manner as to be inappreciable, requiring a quick nasal inspiration in order that their presence may be recognized.

In the sense of Taste we find a similarity in many respects to that of smell. While there is no special nerve assigned

to this faculty, we have the lingual branch of the fifth pair, and fibers from the glosso-pharyngeal brought into requisition. In order that matter may be tasted, it must be in some state of solution, or be rendered sapid. In taste we have particles of matter impinging upon the extremities of nerves in, it would seem, a less attenuated form than that which affects the olfactory organs. When the sapid substance is made to press upon the papilæ, or made to move over them, the sense of taste is more readily excited. Like the odorific particles in olfaction, the substance may repose upon the tongue causing scarcely any sensation, but when the tongue is made to press against the roof of the mouth, its presence becomes manifest. A certain degree of force or motion in the particles, it would seem, is indispensable.

Coming to the sense of Touch, which possesses such a wide range in its powers of recognizing properties of matter, we may find the same law, so far as it regards dynamical influences. Covered over the body we find a minute network of nerve matter, which responds to an infinite variety of forces or motions from the external world, producing impressions corresponding to their size, shape, roughness, hardness, or, it may be, their velocity of motion. In touch, however, so far as it concerns the organs of prehension, the body or object that is to impress the nerves need not always be in motion or be made to impinge itself upon the tactual surface. But what amounts to the same thing, the tactual surface is made to move against the object, and with such motion, as it regards force or velocity, as will bring the qualities of the body or object into harmony with the nerve. In touch, it often requires *velocity* to make up for deficiency

in *size.* In detecting minute points or projections on a body the fingers are made to move rapidly over them. In measuring nervous sensibility in different parts of the body, which is accomplished with a two-pointed instrument, such as a pair of dividers, it is found that the points are the more readily detected when made to move lightly but rapidly over the surface.

While there are certain definitely arranged instrumentalities at the periphery of sensory nerves, by which or through which the various qualities of matter may affect consciousness, yet it would seem that such conditions are not absolutely indispensable, since an individual may be made conscious of light, sound, etc., without the use of these special organs. For instance, where the eye is lost, the person may be made conscious of light by irritation of the optic nerve. By electricity properly managed "an individual may be made conscious at the same time of flashes of light, of distinct sounds, of a phosphoric odor, of a peculiar taste, and of pricking sensations." (Carpenter.)

It would seem that the mode of motion, whatever it may be, by which impressions are transmitted *to* and *from* the nervous centers, must be constantly the same in mechanism wherever the nerves are similar in matter and structure. Transmission through the first pair, or olfactory, would be attended with some modifications, so far, at least, as the change or transformation of matter is concerned, since in this nerve we do not find the true tubular fibers, except some commisural ones passing between the bulb and certain portions of the cerebrum. By many authors the olfactory is not regarded as a true nerve. Todd and Bowman ob-

serve that "it would be most correct to speak of the first pair of nerves as a portion of the nervous center put forward beyond the cranium, in order that it may receive as at first hand the impressions of which the mind is to become cognizant." Substantially the same view is held with reference to the optic nerve.

Transmission through the olfactory nerve is, perhaps, effected in a manner similar to that from one part of a nerve center to another. Owing to the numerous cells and their relation to other unstable matter, transmission would be attended with a greater material change, and, consequently, a greater liberation of motion than could take place in a true nerve.

That there is a change or transformation of matter, not only accompanying nervous action but every vital process in the animal organism, will not be disputed. *Formation* and *transformation* seem to constitute the sum of vital operations.

There is some reason to believe that with the nervous system the unstable condition of matter is such, especially in the nerve centers, as to cause a flow of molecular motion through the nerves, as constant as the currents of blood through the arteries and veins, or the chyle and lymph through their channels of motion. These nerve currents, then, it might be said, *transform* molecules, while the others *transport* them; and if the heart is regarded as the center where force is liberated to transport matter to *form* structure, the nerve ganglions might be regarded as centers concerned in *transforming* structure.

These thoughts bring us to the consideration of that condition of the muscular system variously designated as *pas-*

sive contraction, insensible contraction, tone, tension, etc., the nature of which could we understand, would lead us to some just conception of nervous force. Todd and Bowman (Todd and Bowman's Physiology,) observe: "Healthy nutrition, in our opinion, supplies all the conditions necessary for the maintenance of the tone or passive contraction." From this and other language used in the same connection, we would regard this authority as teaching that the muscles become possessed of this quality quite independent of any other tissue; at least independent of any direct or special influence from nerve centers. Carpenter (Carpenter's Physiology) concludes that the tension is mainly due to a direct influence from the motor centers. He holds, however, that nutrition is indirectly concerned in the matter. Dalton, in his Physiology, teaches substantially the same doctrine as Carpenter, if we regard the distinction which he makes between this tone or tension and *irritability* as legitimate. When speaking of muscular irritability, (p. 372,) he says: "It (irritability) must be regarded simply as a peculiar property, directly dependent on the structure and constitution of muscular fiber, just as the property of emitting light belongs to phosphorus, or that of combining with metals to oxygen." Thus it will be seen that he regards irritability as a condition distinct from the tone or tension, which he says is due to the spinal cord. Whether he regards this irritability as differing in kind or in degree from tonicity is not so clear.

In Todd and Bowman's Cyclopedia of Anatomy and Physiology we find an article by A. Bowman, in which there seems to be no distinction made between irritability and

passive contraction, except in degree. The irritability of a muscle is considered to be in proportion to its healthy development and nutritive condition; and if we have not misunderstood him, the influence from the spinal cord is regarded simply as exalting the condition of irritability. This view of the subject would favor the idea of a "*mutual relation*" between the forces which operate through the nerves, and those observed in muscles and other tissues where no influence through nerves can be discovered. We find a certain degree of irritability or tension in muscular fiber and other tissues, where the nerve has been divided, or where none are discoverable.

Flint, (Flint's Physiology,) so far as we have examined, is quite indefinite. He says: "The tonicity is more or less dependent upon the motor nerves." He terms the condition *insensible contraction*, and which is an "inherent property of all the contractile tissues."

Marshal (Marshal's Outlines of Physiology,) concludes that tonicity persists so long as the muscles are in a healthy condition and are connected with the nerves.

All will agree that heat in a certain degree is absolutely indispensable to the maintenance of tone or tension in any texture, and especially as influencing the nerve current. The benumbing effect of cold is familiar to all; and local anæsthesia by means of ice or the ether spray is quite as familiar to the profession. A healthy condition of the blood, especially as it regards oxygen, must be had. No difference how this element acts its presence in the blood in due quantity is indispensable to a healthy muscular tone. In the animal

organism a general relation exists between oxydation and nervo-muscular energy.

In this state of passive contraction, the muscular system is in equilibrium, the tensioned balance being such that the body maintains an erect position without any special increase of the nervo-muscular current. In partial paralysis the loss of tension in certain muscles is followed by visible or active contraction in their antagonists. Voluntary contraction, which ordinarily involves but a few muscles, is simply a disturbance of equilibrium. It, however, results not from a loss of power in certain other muscles, but from an increase of energy in those which contract. In *tetanus* we have an exalted tension in certain parts of the muscular system, caused by an increased current of molecular motion; and from experiments in tetanizing muscles by electricity, we would conclude that the current in this disease is an interrupted or intermittent one. The increase of tension may be so great that the slightest touch, even a breath of air, will cause severe spasms.

In considering muscular tension in all its aspects, we have unmistakable evidence that there is a persistent connection between the muscles and nervous centers; and that not only the muscles are charged, as it were, with this tension or potential energy, but the entire nervo-muscular apparatus.

In nervous transmission, the current seems to increase in force and velocity in its onward progress. In experiments it is shown that irritation applied to the nerve near a muscle will not have as powerful effect as when applied at a point more distant. The current, moreover, is not a continuous one; it is attended with a regular rythm, or a wave motion

whose periods of vibration or pulsation are too rapid to be measured by any known means. The velocity of transmission, according to Helmholtz and Du Bois Raymond, is about ninety-three feet a second; some have placed it much higher, even to three hundred feet. Perhaps one hundred feet a second accords with the majority of observers. The velocity is so slow in comparison to what has been assumed as the velocity of electricity, that arguments in favor of the identity of these forces seem to be invalidated. Electricity is generally named as having a velocity of 280,000 miles a second, which would be nearly 15,000,000 times greater than nerve force. In view of such a disparagement in velocities, we are led to the consideration of the velocities of the usually named modes of motion.

Light and heat, it is said, travel from the sun at the rate of 200,000 miles a second. Sound is propagated through the air at a temperature of 32° F., at the rate of 1,090 feet a second. Chemical action may progress in a definite direction with a rapidity incalculable, or so slowly as to require years to determine whether it moves at all, owing altogether how it is *conditioned*, just as it is with sound and all other conceivable modes of motion. Sound, while its velocity through air is as stated, is made to vary according to the medium through which it is propagated. Dulong's experiments with gases at a temperature of 32° F., show that sound is transmitted through hydrogen at the rate of 4,164 feet a second, while through carbonic acid it has a velocity of but 858 feet. With a number of liquids at a temperature of 60° F., a solution of chloride of calcium gave the highest velocity, 6,499 feet; spirits of turpentine the low-

est, 3,976. With solids, at about the same temperature, the velocity through lead was 4,030; while through iron it was 16,822. With different kinds of wood the variation was not so great; as, for instance, with poplar, along the fiber, it was 14,050 feet; in aspen, 16,677. There was found, however, to be a vast difference in the same kind of wood as to whether the conduction was along the fiber, along the rings, or across the rings. Thus in aspen, as we have seen, the velocity along the fiber was 16,677 feet; along the rings of growth it was found to be but 5,297; and across the rings only 2,987.

The difference in the velocity of sound is doubtless owing to a difference of molecular structure in the media through which it is propagated. Experiments with crystals show that there is, as with wood, a difference according to the direction of the transmission. Tyndall, while speaking upon this subject, remarks: "Such bodies for the most part have their molecules arranged in different degrees of proximity in different directions, and where this occurs there are sure to be differences in the transmission and manifestations of heat, light, electricity, magnetism and sound."

If electrical transmission consists in what Grove supposes, "a molecular polarization of ordinary matter, or as matter acting by attraction and repulsion in a definite direction," or, as he intimates in another place, "transmitted chemical action," we can not conclude that its velocity through all media is the same. If it is, it is quite absurd to speak of *active* and *feeble* affinities, for such terms necessarily involve the idea of differences in velocity.

But we wish to notice some of the more recent views

respecting the velocity of this agent, electricity. Geo. B. Prescott, an electrician of some celebrity, in an article to the "Journal of the Telegraph," dated January 4th, 1870, says: "This power, (electricity,) like all other forces in nature, is governed by the circumstances under which it is exerted, and its speed depends upon certain absolute conditions, among the principal of which are the length, size, quality and nature of the conductor through which it is transmitted." "All substances are conductors of electricity, but differ extremely in degree." "Thus," he continues, "the difference between the speed of electric transmission of pure copper and gutta percha is two hundred million million million times, or about the same as that between the velocity of light and that of a body moving through one foot of space in six thousand seven hundred years." According to this writer, the velocity through pure copper is six times greater than through an iron wire of the same size and length, and a velocity four times greater may be had through an iron wire one-fourth of an inch in diameter than one of the same material only half as thick.

Observations of Faraday and Sir William Thompson on ocean telegraph cables, show that the velocity of electric transmission depends upon the size, quality and length of the conductor. The velocity through the Atlantic cable, according to Prof. Gould, does not exceed eight thousand miles a second. Of course a shorter conductor would give a greater velocity, as there would be less resistance.

Respecting light, its velocity is found to vary according to the medium through which it passes. MM. Fizeau and Foucalt have established the fact that its propagation is

slower in proportion as the media are more dense. Radiant heat is also modified in speed by the character of the substance through which it passes.

To assign a definite velocity to any mode of motion without specifying what the conditions are is quite absurd, and has, we believe, been a fruitful source of error. The velocities usually assigned to light, heat and electricity are maximums, attainable only under the most favorable conditions. What the minimums may be under the most *un*favorable conditions, is quite a different problem, and must be very difficult of solution.

In regard to the molecular change which takes place in nervous transmission, we may form some general idea when we look at the character of the matter composing nerve tissue. Should our chemical knowledge become anything like complete, we might, as Lehmann observes, know something definitely concerning nerve force. As to the character of the matter, this author (Physiological Chemistry, vol. 2, p. 265,) observes: "In correspondence with the physical and physiological phenomena of the nerves, we find a substance accumulated in them which exhibits such mobility in reference to its proximate constituents as is not to be met with in any other organ of the animal body; the chemical phenomena very probably, therefore, stand also here in the closest relation to the physical and physiological." Again, (same vol., p. 304,) he remarks: "The chemical quality of a substance, for the most part, corresponds to its physiological importance; thus we find that the more complex atoms, the chemical particles of which have a less stable equilibrium, occur especially wherever the higher functions of

material life are manifested." And again, in the same connection he says: "The manifestation of each force is connected with the nature of the mass which is to be acted on, whilst the effects depend upon the circumstances under which the force is brought to bear upon the mass." On page 263, in speaking of the two cerebral fats, he shows that whatever their true character may be, they are "extremely prone to numerous decompositions." They are, to use his language, "mere admixtures of substances of which the one may have served the other as a medium of solution or distribution." "The presence," he says, "of nitrogen in the cerebric acid, and Fremy's assertion that albumen passes into the ethereal solution, are questions which, singularly enough, have hitherto failed to excite observers to any more exact investigations, and although they are at variance with pre-existing observations, may very probably be of great significance in reference to the function of the nervous system, which is so immutably connected with its chemistry."

Enough is known respecting the character of nerve matter to say that it is some form of fat or albumen exceedingly prone to change, and not very unlike the various forms of protoplasm found throughout organic life, and in which the vital processes are manifested with the greatest intensity. It requires but a very slight modification of albumen in order for it to become consolidated into different textures; for instance into syntonin or muscle fibrin. Respecting the material changes which result from muscular contraction, they must be very considerable, judging from the phenomenal occurrences. The development of heat constantly attends contraction. MM. Bilroth and Fick found that

with persons who have died of tetanus the muscles sometimes indicated a temperature of nearly 11° F. above the natural standard. Helmholtz's experiments upon the muscles of frogs furnish interesting proof of the evolution of heat. Contraction modifies the process of blood changing from arterial to venous. Prof. Ludwig, of Vienna, found that arterial blood in passing through muscle, in an uncontracted state, retained seven and one-half per cent. of its oxygen; in a contracted state, it retained but one and three-tenths per cent. A change from alkalinity to acidity in the muscular juice incident to contraction has been noted by various observers.

Respecting the real nature of nervous force, which is accompanied by such change or disintegration of muscular tissue, we know as yet but little. Some who exclude the idea of its being a mysterious, incomprehensible vital principle, regard it as molecular motion attended by isomeric transformation of matter; others speak of it as the polarization of matter; others again, as chemical action, magnetism or electricity. As long as we are quite ignorant as to whether there is any real difference in the nature or mechanism of these modes of motion, it will be difficult to adopt a term that will afford satisfaction. It may be found that the only difference between these forces consists in one being more simple or less complicated than another—the amount of labor which they perform may be different. One may be the motion of simple atoms or molecules, and another of a group or system of molecules, and yet another of a doubly compound system. Where we have matter so heterogeneous as to involve all these molecular groupings or complexities,

it would not be strange to find, as we sometimes do, all the usually named modes of motion, such as light, heat, electricity, magnetism, chemical affinity, and even mechanical motion, in operation, apparently, at the same time; but it is motion, nothing but motion.

We have no reason to believe that the laws of celestial dynamics are different from those which operate upon terrestrial matter, since the constitution of matter throughout the universe appears to be the same. A mere speck of creation, so far as it concerns motion, may represent in miniature a moving world. Presuming this to be true, it will be considered as no digression to refer to celestial phenomena for proof or illustration touching the question before us. Modern astronomy and philosophy regard the bodies composing the solar system as magnetized or polarized, and that their motions involve a change of polarity, occurring at regular intervals according to their respective periods. In this polarity is found the true interpretation of their motions, which, if traced back to an ultimate cause, will be found to consist of the aggregated polarized motions of the atoms or molecules of which these worlds are composed. In these planetary motions, as various as they appear, we have, at most, but two forces; and we hear of the terms *attraction* and *repulsion, gravitation* and *projection, centrifugal* and *centripetal, action* and *reaction*, etc. Now, these terms are as frequently used, and we believe as appropriately, in treating of molecular motion as planetary. If molecular motion in its mechanism is the same as planetary, we can feel quite secure in regarding it as the polarization of matter, no difference in what this really consists,

or in what terms we express it. We find a frequent use of the term *polarization* by almost all writers on physiology, notwithstanding their avowals that the forces at work in the animal organism are distinct from those belonging to ordinary matter.

In a memoir entitled Heat, Light, and the Combinations of Light, Sir Humphrey Davy concludes that the molecules of matter, which he terms corpuscles, are acted on by two opposing forces, attraction and repulsion. The effect of the attraction of cohesion on the corpuscles of bodies is "exactly similar," he says, "to that of attraction of gravitation on the great masses of matter composing the universe; and the repulsive force is analogous to the planetary projectile force." Thus it will be seen that this great philosopher has done what we have feebly attempted to do, linked, as it were, the motions of molecules and worlds together. And should the phenomenon of motion be traced through all its conditions and complex relations, it would be found to involve systems of molecules, as well as systems of worlds.

Mayer, in an article on "Organic Motion and Nutrition," holds as an axiomatic truth that during all vital processes there is a conversion (change) of force as well as of matter. Hence it would follow that a certain form of force liberated, for instance, by a nerve center, and propagated through the nerve to a muscle, causing contraction, would be converted or changed to some other form; unless the change of matter in the nerve center and the muscle were the same. That the change of matter is similar is hardly supposable, since there is a structural difference in the tissues involved; besides, it does not comport with experimental observation.

The residual products of change or metamorphosis of nervous and muscular tissue are not the same. There is probably a change of matter and of force in the nervo-muscular apparatus relatively as great as there is with the electro-magnetic telegraph; and the changes, so far as it regards number, are the same, if we regard the nervo-muscular system as consisting of a muscle, nerve and a single ganglion. In a complex nervous system, where the force or motion originates in a higher center, involving in its course subordinate ganglia, the change of matter and transmutation of force may occur oftener. In such a case we might liken the change to that of the magnetic telegraph provided with repeaters at various stations, where there may be not only a change but a reinforcement of the energy first initiated.

In isomeric transformation, a phrase which we can not object to unless used in a restrictive sense, there is, it is said, the re-arrangement of matter without altering or destroying its physical continuity. It is claimed that the change is different from ordinary decomposition, inasmuch as the organic form of matter may be more readily restored. Without going into the history of isomerism as exhibited in inorganic matter, we may mention the fact that with various substances such a change can be induced, and the rate or velocity of its motion in a definite direction be determined. In the case of amorphous antimony, the change to a crystalline state may be induced by different agents, and among others, slight mechanical motion. The transformation is accompanied with evolution of heat, which, if not absorbed by contiguous substances, facilitates the process with

increased velocity. This capability of isomeric change is a quality possessed in all probability by all substances, even by those regarded as elementary. This is suggestive of the idea which is forcing itself upon the minds of chemists, that all matter is resolvable into unity, the same as all the forces or modes of motion. Spencer, who brings forward these experiments of Mr. Gore's with antimony, and who considers nervous force to consist in isomeric transformation, makes an application of some significance. Assuming that the change in a substance is accelerated in proportion as the heat evolved is retained, there would be in nervous transmission a constant increase of motion as the influence progresses. The axis-cylinder of the nerve, as he concludes, is so conditioned that there would be but little lateral absorption of heat.

There is, perhaps, some reason in adopting the phrase *isomeric transformation* by which to express nervous action. If, however, this force, like all molecular motion, consists in a change of polarity, we do not see that the term possesses any special advantage over the one more frequently used, *polarization;* yet we would admit that it may be more specific. As it regards nerve force being some form or condition of electricity, we may try to exclude the idea, but still the dream, as some have termed it, haunts us. And it may turn out after all that those who have advocated the theory have "dreamed a dream that was not all a dream." We have shown, we think, that the question of velocity should not exclude the electric theory. The countless thousands of cells in the nervous centers, and those in ganglia interspersed through the various organs and tissues, are all

expressions of potential energy; and when their motion is liberated in a collective manner, the resultant force becomes appreciable. When there is but a single cell with its two fibres, constituting, in its structure and activity, the most simple form known of a reflex nervous apparatus, the influence must be very feeble.

While we look chiefly to the cells of nerve centers for the liberation of motion through an efferent nerve, there must be some similar arrangement for initiating motion to be propagated through an afferent nerve. We find at or near the extremities of afferent nerves cells or corpuscles, not very unlike those found in the centers, and besides we have those remarkable bodies styled Pacinian corpuscles in great numbers, especially in connection with the nerves of the hands and feet. They exist sparingly on various other nerves, and may be observed in considerable numbers on the plexuses of the sympathetic; but what is remarkable, they are never found on a nerve of motion. Their absence on this class of nerves is suggestive of the idea that they are concerned in the initiation of an eccentric current, and thus answer, to some extent at least, to the cells of a nerve center which initiate a centric current. These oval bodies in the human subject are from one-twentieth to one-tenth of an inch in length; and from their construction and their peculiar connection with the axis-cylinder of the nerve fiber we can not but conclude that they are directly concerned in the liberation of somé force or motion which is to be propagated along the nerve. Pacini, the discoverer of these bodies, compares them in structure to the electrical organs of the *Torpedo;* and we find that Henle and Kolliker favor

the same idea. Supposing this corpuscle to be really a little battery or Leyden jar, what effect could it have in sending a current through a nerve tube? We may answer by asking what effect a battery composed of a gun cap and a drop of water from the ocean could have in sending a message through the Atlantic cable from England to America? This has been accomplished, if there is reliance to be placed in an editorial article found in the "Journal of the Telegraph," for April, 1870. Certainly the size of the gun cap compared to the magnitude of the task performed, is quite insignificant to the Pacinian corpuscle. And besides, if nerve force consists in some form of electricity, we may suppose that the *nerve tubes themselves act as Leyden jars*, charged, as it were, with force, thus maintaining a *tension* in the nerves as well as in the muscles. This may have been the condition of the oceanic cable when the miniature battery referred to was used. If the cable had already been full, as it were, of static electricity, a very feeble influence might disturb the equilibrium, producing an appreciable motion in the receiving instrument at the farther end of the line. We have frequent allusions to this tensioned condition of submarine cables. A distinguished German professor says that "the Atlantic cable may be considered as a Leyden jar in which, when the inner insulated wires are carrying a message from America to Europe, those forming the outer layer should re-convey it from Europe to America." Faraday, in experimenting with submarine cables, explains certain phenomena connected with electric transmission, by likening the cable to an enormous Leyden jar, the wire constituting the interior, the water the

exterior coating with the gutta percha insulator between them. A comparison might be instituted, showing some resemblance in structure and condition, of a nerve fiber to a submarine cable.

The fact that electric currents are found in nerves and muscles does not afford direct proof that the nerve current proper is electrical, since such currents exist in various animal tissues, and, in fact, in all organic structures. The observations of Edward Smith, M. A., as given in the "London Chemical News," establish the fact that in the stems and leaves of plants, as well as in bulbs and roots, also in fruits, there are currents of electricity. These currents he found passing in different directions according to the kind of plants examined. In some bulbs, the potato for instance, the current was from the center towards the outside; in a lemon it was in the opposite direction. With some plants the current in the leaf-stalk was towards the leaf, in others it was the reverse.

Matteucci's experiments show that the electrical currents in muscles are directed from the interior to the surface. He regards these currents as due to the chemical process involving waste and supply which is continually going on in the muscles. They attend the state of passive contraction and are manifest only while this condition lasts. It was found that for electricity muscle is a better conductor than nerve, and nerve better than brain. The conducting power of muscle is four times greater than nerve. The duration of a muscular current was found to correspond with that of contractility. In cold-blooded animals the duration was the greatest. In birds it was very brief. Temperature had

a great influence on the currents. Deficient nutrition diminished the currents. The more red and firm the muscles, the more distinct were the signs of electricity.

An objection to the electrical theory of nerve force is found in the fact that when a nerve is firmly ligated the nervous influence is arrested, while it causes no obstruction to an electrical current; and doubtless if the nerve were compressed throughout its entire course as firmly as at the point of ligation, it would conduct a current from an ordinary machine, and of such strength as is generally used in these experiments. It would use the nerve in its course, as it were, as a whole, which we have reason to believe it does in the experiments upon nerves by means of an artificial machine. Could an experiment be instituted by which the electrical current or currents could be made to pass through each axis-cylinder of a nerve in an insulated condition, and of feeble strength such as these microscopic conductors indicate, we have reason to believe that compression at any point sufficient to destroy insulation would be attended with retardation of the currents, or, at least, lateral conduction and dissipation. And if, as we have suggested, each nerve tube acts as a Leyden jar, and its tension is a necessary condition to nervous transmission, legation must necessarily interfere with the nerve force, while, as we have said, a current from an artificial battery might be propagated through a nerve as a whole, which would not be regarded as a jar charged with static force, but as an ordinary conductor.

The *electrical fishes* are often referred to in discussing nervous force. That it is electricity which these animals

discharge, there is no question, since all the phenomena answer to electrical action. With these animals the electricity seems to accumulate through nervous agency. If the nerves are destroyed, electricity ceases to be developed. Any general excitation of the nervous system will cause at the same time a discharge of electricity and muscular spasms. It appears somewhat strange that two distinct forces should be thus discharged at the same time through nervous agency. It is more reasonable to suppose that the forces are the same, or at least that they are but different forms of the same force. Matteucci concludes that they are correlated, each being able to generate the other. This relation then is sufficiently close to warrant us in saying that the only difference between them is one of *condition.* If the material instruments through which they operate were the same, we should discover no difference in their manifestations. It appears that the electrical apparatus in these fishes becomes charged by an influence from the nerve centers, and probably this tension does not differ essentially from that present in the nervo-muscular apparatus proper, except in degree. The exhaustion caused by the liberation of electricity in these animals is the same as that following muscular contraction; therefore, leaving out the question of identity, we would conclude that electricity, to some extent at least, serves the organism as a vital force upon which its energy depends.

In discussing the electrical theory of nervous force, Todd and Bowman in their Physiology adopt the following from the Philosophical Transactions for 1839: "From the preceding review of the arguments for and against the theory

of the identity of nervous force and electricity, we are led rather to reject than to adopt it. The same reasons induce us to regard the nervous force as a power developed in the nervous structure under the influence of appropriate stimuli, as muscular force is developed in muscle under similar influence. Both tissues are characterized by their tendency to assume a polar state, different in each, although analagous, in obedience to certain excitants. That this polarity bears a remarkable analogy to that which may be produced in inorganic matter is evident."

This authority, and many others that reject the electrical or magnetic theory, can perceive *polarity* and *polarization* as connected with nervous action and various other vital processes, but fail in seeing that electricity or magnetism, as modes of motion are concerned in the matter. If the forces involved in the vital processes are entirely distinct from electrical or magnetic action, it would seem inappropriate to use the terms *polar, polarity* and *polarization* to designate the states or affections of the matter composing the animal organism. Such states or affections legitimately belong to electrical phenomena, and the terms employed to express them should for consistency be abandoned by all who hold that the vital forces are entirely unlike the ordinary forces of nature. In the animal organism, throughout the various organs and tissues, there is found electricity, magnetism, chemical affinity, and in fact all the different forms of force known to inorganic matter, at work, as it were, in an invisible manner among the countless millions of molecules that compose the body; and besides, from pieces of muscle, nerve and other tissues, a Voltaic pile may be constructed showing

that animal matter is capable of generating some of these forces; yet when we approach the more sensible forces such as muscular contraction, respiration, circulation, etc., which are really the visible manifestations of the molecular forces, we find persons who regard them as neither electrical, chemical, thermal, or as any other known mode of energy. This view of the subject would involve the idea that the ordinary forces serve but little purpose in the animal economy, and for forces of real utility we are to look for some extraordinary, undefinable force or forces, ordained to operate independently of the other common modes of energy.

Perhaps Maudsley in his incomparable work, "The Physiology and Pathology of the Mind," has expressed the truth in regard to these forces. "The vital force," he says, "gathers up, as it were, into itself inferior forces, and might be said to be a development of them, or, as in the appearance of nerve force, simpler and more general forces are gathered up and concentrated in a more special and complex mode of energy."

From the fact of the transmutation of the forces, which, perhaps, really means that they are resolvable into unity, we must regard the force which is displayed in muscular contraction and in the transmission of sensations through the nerves, as not peculiar to animals possessing a nervo-muscular system proper, but that it may be found in all living forms, and perhaps has a universality as great as matter itself. In irritability, which has long been regarded as an endowment of organized matter, we have doubtless a low or simple form of that force which is to be concentrated and utilized in co-ordinating the higher and more complex

forms of life. Spencer says, "The fundamental attribute of matter is resistance. The fundamental sense is a faculty of responding to resistance." We find forms so simple in structure and function as to exhibit only the power of responding to the touch or contact of bodies. We say they possess *irritability,* which enables them to exercise this simple function, which consists in a contraction of the part touched or of the whole animal. This simple motion is the sum of its visible energy, and the sensation which is experienced is of the simplest order, since the quality or kind of body which touched the animal is not perceived. Ascending a little higher in the scale, we meet with forms whose structure and functions are more differentiated or specialized. These may be impressed not only with the sensation of the presence of a body, but with the kind of a body as differing from some other, and also with some of its qualities, as size, shape, hardness, etc. Thus, in ascending the scale of life, we find structure, and consequently function, becoming more specialized and differentiated until we reach man, in whose organs and functions is found the greatest diversity yet attained. However, in ascending this scale, we soon reach a point where we discern faint traces of a tissue designated as nervous, whose office is to establish a more direct and extended correspondence between the outer and inner relations of life. It is not until we reach the higher *Radiata* that we find definite indications of a connected nervous system; and the question is as to whether in a lower class of animals, as for instance the *Protozoa,* where nerve structure is absent, we are to find a force or motion answering to that which is propagated through nerves in the higher

classes. It has been proposed that nervous matter exists in these lower animals in a "diffused form," or that it is incorporated with other tissues. Dr. Carpenter, however, (Principles of Comparative Physiology,) says this is a gratuitous supposition, and he falls back on the old doctrine of special endowment to account for motion where no organized nerve tissue is found. Yet, on page 643 of the same work, he finds nervous agency operating where no nerve tissue is discoverable. In certain varieties of the *Bryzoa* he finds what is regarded as a nervous center. "No branches however," he says, "have been seen to proceed from it, either to the tentacula or to the muscles; but the activity of the movements of these animals with the perfection of their muscular structure, (the fibers being striated in many species,) would seem to indicate that nervous instrumentality is concerned in them." And again, on page 635, we find him saying that "The form of muscular tissue which most readily obeys the stimulus of innervation and which is the instrument of the most purely animal functions, is that which most perfectly exhibits that *cellular* type of structure which seems common to all the parts most actively engaged in the vital operations; and that the act of muscular contraction in the highest animal is due to the same kind of change in the form of the cells of the ultimate fibrillæ, as that which produces the sensible motions of plants."

Carpenter is here referring to the motions exhibited in the *Mimosa* and *Hedysarium gyrans*, the latter a Bengalese plant upon whose petioles are found three leaflets; the central or larger one is raised and depressed by solar influence. The lateral leaflets have a constant rythmical motion day

and night, by performing a gyrating movement which requires thirty or forty seconds, when they rest for about a minute to repeat the same motion. The leaflets do not move together, but in opposite directions. If, as he says, muscular contraction in the highest animal is due to the same kind of cell change as that which produces motion in plants, it would be difficult to perceive any difference between the forces that operate in producing motion through nerves and those operating in these plants, since the same change is effected in both cases. We have reason to believe that currents of molecular motion exist in all organized matter. They are present especially in all the different forms of protoplasm found in vegetable as well as animal life. And perhaps in these currents we have the plastic forces which, under the necessary conditions, may increase in energy and mould the various structures of a new being. In the earlier stages of embryonic life these currents are present, and soon result in visible channels which eventuate in permanent vessels or conductors of motion. As to how a nerve originates by a current of molecular change, Spencer should be consulted. Whether his exposition of the matter is true or false, he has exhibited great genius in dealing with this evolutionary problem.

That there are impressions of a primitive order received and transmitted through tissue devoid of nerve structure proper, there can be but little doubt. We see the fact illustrated in the lower forms of animal life already referred to. The correspondence which takes place between the outer and inner relations, though extremely limited, partakes of that reflex action which has attained through a nervous

system such a degree of perfection in the higher order of animals. Of the development or presence of nerves in granulations, Paget (Surgical Pathology) says he knows nothing. "I have never," he observes, "been able to see any in either granulations or cicatrices." He thinks that the acute pain upon touch may be owing to "the force of contact or the change that it produces" being "propagated through the layer of granulations, which stimulate the nerves beneath them, as contact with the exterior of a tooth excites the nerve filaments in its pulp." This explanation may be correct, but it would be more satisfactory to know in what that change and propagation which he speaks of consist. The transmission of sensation may be through those currents which are in operation building up the new structure. On page 305 of the same work, while speaking of inflammation, he classes nerve force as "among the plasturgic forces." And on the succeeding page he says that "nervous force is habitually and directly engaged in the act of normal nutrition."

Now it is held by the best authority that the nutritive process in no wise differs from that engaged in the development of structure; hence, we would look for a nervous influence in all structures where the nutritive or developmental processes might be found, whether nerve tissue were present or not. But we are pleased to notice that Paget does most unequivocally recognize a form or mode of energy operating in all structures, which is convertible or which has its correlation with the force manifested through the nervo-muscular system. On page 49, when referring to the arguments against nervous agency being concerned in nutri-

tion, he says: "Another argument implies that the nervous force can manifest itself in nothing but impressions on the mind and muscular contraction force. So limited a view of the convertibility of nervous force is such a one as the older electricians would have held had they maintained that the only possible manifestations of electricity were the attractions and repulsions of light bodies, or that the electric force could never be made to appear in the form of magnetism, of chemical action, or of heat. We are too much shackled with these narrow dogmas of negation. The evidence of the correlation and mutual convertibility of the physical forces might lead us to anticipate a like variety of modes of manifestation for the nervous and other forces exercised in the body. We might anticipate, too, that as the nervous force has its origin in the acts of nutrition by which the nerve substance is formed, so by reciprocal action its exercise might affect the nutritive acts. As (for illustration sake) the completed blood effects all the processes by which itself was formed, so, we might suppose, would the nervous force be able to effect all the acts of which itself is the highest product."

In the development of the higher order of animals we find that the plastic forces have been in operation for some time, and that evolution is considerably advanced before nerves and the forces operating through them could contribute anything towards the forces and motions at work evolving new structure. Von Baer has demonstrated that blood is formed before the vessels, and that this formation goes on in different parts of the body. When formed, he says it is put in motion by some force that "impels it in a proper

direction until it reaches the central formation of blood," around which is developed a tubular canal afterwards to be further modified into a heart. The heart may be seen to pulsate before nerves can be discovered as connected with it. Thus we may have vessels with blood circulating in them, a pulsating heart, and various other processes which are necessarily implied, such as a digestive change in the supply material, secretion, excretion, etc., before an influence operating through the nervous system is in requisition. Will we conclude that after these plastic forces have carried their work thus far, even to the moulding of the nervous system itself, that a new and distinct force is to originate in some manner, and take possession of this structure? It is more reasonable to suppose that during the embryonic stage of life, the same forces which were first set in operation carries forward the various processes of evolution to their completion. If the new being is to be endowed with a new vital principle, we might with some propriety conclude that its reception takes place at the time of its birth, when the "breath of life" seems to impart new and distinct energies. But after all, we know that the breathing of air is but another mode of furnishing oxygen to the new being; and instead of its imparting new and distinct modes of energy it simply increases and extends the influence of those already in operation. As Paget says, to suppose that nervous force is found only in connection with the nervo-muscular system, is taking a narrow view of the matter. Yet such a view accords with the teachings of physiologists up to a comparatively recent period.

In taking a general survey of animal life, we conclude

that the nervous system, arranged as we find it, serves the purpose of co-ordinating or bringing into mutual relation and dependence all the various parts of the body, and thereby extending the correspondence between the outer and inner relations, or between an external and an internal world; the former made up, as it would seem, of *facts*, the latter of *fac similes*. And for power to accomplish these results, the ordinary forces of nature are employed, the nervous force forming no exception.

With man the specialization of structure and function has been so extended, that his environment or sphere of action is almost unlimited; and consequently the number of different impressions or sensations that may be transmitted through the nerves is beyond all human calculation. And the question is to know in what manner the mind is enabled to distinguish between them. There is no necessity for a special nerve tube for each separate impression, any more than there is for a special or distinct wire for the conveyance of each separate impression or stroke of the telegraphic instrument. All impressions to be transmitted through nerves are, as we have attempted to show, the result of some form of force or motion. In the case of hearing, consciousness may distinguish between a multitude of separate and distinct sounds. It may not only do this, but it may distinguish between the millions of combinations or changes that may be produced in the series of such sounds. The electric telegraph, perhaps, affords a good illustration. An unlimited number of impressions or ideas may be transmitted through this instrument and made to effect the consciousness of an individual by the changes that may be produced

in the use of but about forty distinct strokes or motions of the key. The carrier or agent of transmission is constantly the same, and there is but a single wire or line of communication.

At the periphery of sensory nerves we have, as before stated, certain instruments by which intelligence through motions and their combinations may be transmitted to the brain, informing the mind of certain transpiring events; just as an individual may be informed through a telegraph of what is taking place at the farther end of the line. At this distant end of the telegraph line, however, there is an intelligent operator, who handles or works the key; but we shall see that the services of this operator may be dispensed with, and still intelligence be transmitted. An instrument might be so constructed and attached to the end of a line that the wind, the rain, the heat of the sun, or other meteorological conditions could affect it, producing motions to be transmitted through the wire, and translated by the person receiving them into intelligent ideas. And suppose there were certain arrangements connected with this instrument by which an efferent or motor current could act in adjusting and re-adjusting the instrument, thus adapting it more nicely to the direction of the wind or other dynamical influences; the impressions to be transmitted might be more numerous. And again, could an instrument be so contrived that a motor current would cause it to lay hold of certain objects in its reach and bring them in contact with the operating instrument; or could the operating instrument itself be made to move about and feel, as it were, for objects, the impressions and sensations that might be transmitted and translated by

the mind into knowledge, would be still more numerous. Such a line of telegraph would represent the workings of the nervo-muscular apparatus as we find it in the human arm; or in the proboscis of the elephant, where olfactory impressions as well as tactual are received and transmitted.

In the case of a surgeon probing for a ball, or sounding for stone, it is *motion* transmitted through the metallic instrument that impresses his consciousness with the presence of the body he is seeking. He has learned by experience to distinguish between the different motions caused by the instrument impinging upon different substances. In these tactual operations the presence of a stone or leaden bullet may be known, not only by the vibratory motion of the instrument affecting the nerves of touch, but the auditory nerve may be impressed with sound waves of such length or pitch as can originate only from a metallic rod of a given size and length brought into collision with a hard and compact body of a certain magnitude. Thus we may have the testimony of "two witnesses as touching one thing."

Man has devised many supplementarty instruments of touch, of sight, and of hearing. They are practically extensions or prolongations of the nerves of these senses, and serve the purpose of carrying on a more extended correspondence with the external world. Franklin's kite-string was but the prolongation of a tactual nerve feeling, as it were, among the clouds for certain impressions to be transmitted to the brain. But no instrumentality has been devised for transmitting intelligence from mind to mind, that can compare with the electro-magnetic telegraph, when all its powers and adaptations for correspondence shall have

been made known. Oceans and rivers have long served the world as channels of thought; but there was lacking that co-ordinating nervous system, as it were, which the magnetic telegraph is destined to fulfill. But it is not claimed that thoughts or ideas of themselves are transmitted by electricity through a wire. Neither can it be claimed that they are transmitted by nervous force through a nerve. In both cases it is a dynamical force or motion that is propagated through the conductors, and the different qualities or measures of the motion are representatives of thoughts or ideas which the mind has learned to translate. Any known mode of motion may be employed as an agent for the transmission of intelligence; and without motion of some kind, mind can not communicate with mind, nor mind with matter—all correspondence between the internal and external world is at an end—all is *silence, darkness* and *death.*

SOME POINTS

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ILLUSTRATED BY CASES.

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In the observations which I am about to make on the therapeutics of electricity, I purpose to draw from my own experience some conclusions as to the real value of this force as a remedial agent. Every new remedy encounters two sources of difficulty: the exaggerated claims of its advocates; the incredulity and depreciation of those who oppose its use. From this exaggeration on the one hand, and depreciation on the other, the remedy can be saved only by a rigid analysis of clinical experiences.

We are helped to correct views of the therapeutical powers of electricity only to a limited extent by a study of its physiological actions. Many of those uses in which it is conspicuous for good, are purely empirical in their inception and practice. There is great need, then, for the multiplication of observations.

A difficulty which we already encounter, and which is likely to be more embarrassing in the future, is the pretty wide-spread belief that *electricity* is, so to speak, *electricity*, and that it matters little which mode of this force we employ. We already hear of those who do not have good results in the use of electricity in suitable cases; but when we come to look into their methods, we find that they employ for all purposes induction electricity or Faradism. It is an unpleasant statement to make, but it is true that many physicians are ignorant of such elementary knowledge of the science as the difference, physically and therapeutically, between Galvanism and Faradism, and hence listen with an ill-concealed incredulity to the difference in results obtainable by them respectively.

In order to present my facts in a methodical manner, I shall arrange them in related groups.

1. *Galvanism in Diseases of the Nervous System.* In no conditions is the Galvanic current more effective for good than in certain disorders of the cerebral circulation. I had the honor last year to present to the Society some experimental investigations on the effects of galvanization of the cervical sympathetic, showing the striking influence which this application has over the arterial tension and the motive power of the heart, and through these agencies over the intra-cranial circulation. Hence, the use of the galvanic current to modify morbid states of the brain rests in part on a physiological foundation.

In commencing *œtheroma of the arteries* with consequent impairment of nutrition of the brain, characterized by vertigo, headache, loss of memory or more serious disturbance

of the mind, nausea, etc., I have had good results in six cases, all in which I have applied galvanism. A current from six cups of Siemens and Halske, with a needle deflection of ten degrees, was passed in these cases transversely in both directions through the head, and the superior ganglion of the cervical sympathetic on both sides was included in the circuit. The *seance* was usually about five minutes in duration, and the application always ended when giddiness supervened. It is important to enter upon the treatment before centers of softening have been established, or extravasation has occurred. In none of the four cases of *hemiplegia* in which I used galvanism did a cure result. Others have been more successful. Galvanism, although powerless to cure hemiplegia or to remove adventitious products in the brain, gives remarkable relief to some of the most distressing symptoms accompanying intra-cranial lesions. This statement may be best illustrated by some examples.

A lady from Keokuk, Iowa, came to me for treatment of an intractable neuralgia. Shortly after a miscarriage in which there was frightful hemorrhage, she was taken with an excruciating pain in the right ear. This was followed by vertigo of a very constant and distressing character, and intense pain in all the branches of the fifth, especially the ophthalmic. There were present, also, injection of the eye, profuse lachrymation, and a dilated pupil. Soon after these symptoms appeared, she experienced an extreme degree of dysphagia, which interfered so much with nutrition that she rapidly lost in weight. Paralysis of the palate muscles existed on that side and the uvula was strongly deflected to

the left. When she made the attempt to swallow, she suffered frightful apprehension, and liquids were rejected through the nose. The sense of taste was entirely abolished and the tactile sense much diminished on the right side of the tongue. Notwithstanding the formidable character of these symptoms, a stabile descending current from six cups of Siemens and Halske removed in five applications all of these symptoms except the vertigo. Mind, I do not say, removed the intra-cranial lesions, for since her return home I have heard that the vertigo continued.

Mr. B——, superintendent of the Ohio Machine Works, a well-preserved man of fifty-four years, had suffered for several years from cerebral symptoms. He came to consult me for violent hemicrania of the left side. During these attacks of pain, the external ear was swollen and highly sensitive, and numerous sensitive points were developed in various parts of the scalp. There was some drooping of the right upper eyelid and paresis of the muscles of the face supplied by the seventh. A marked difference in muscular power was ascertained by the dynamometer, the right side being the weaker. Two applications of the constant current removed the neuralgia. He has also very much improved in muscular power, but the good results in this respect are only partly due to the electricity.

I do not wish to be understood as denying the usefulness of galvanism in hemiplegia. Any agent which can relieve some of the more distressing symptoms must unquestionably favorably affect the centric lesions, but that cures can be accomplished by means of it certainly no facts in my possession warrant me in asserting.

The power of galvanism to relieve *pain* is now conclusively established. Even in those cases of hemicrania and tic douloureaux dependent on incurable organic disease of the brain, the constant current affords a marked degree of temporary relief. Galvanism is curative in cases of simple hemicrania not due to malarial or other cachexy. That common form of neuralgia of the fifth nerve known as "sick headache," is almost always cured by mild descending stabile and labile currents, applied with some regularity, not only during the attacks, but also in the intervals between them. I have failed, however, in relieving attacks of headache which were merely symptomatic of stomach disorder.

Two cases of *herpes zoster* limited to the distribution of cutaneous branches of an intercostal nerve, were rapidly cured by mild descending currents. Of four cases of *pleurodynia* and *intercostal neuralgia* treated in this way, one only was cured.

As is now well known, galvanism is the most effective remedy for *sciatica.* Ten cases of this painful affection occurring in my practice, thus treated, resulted as follows: five were cured within a week; three within two weeks; one was improved only after several weeks of treatment; and in one the current failed of benefit, except temporary relief of pain. One of these cases is so remarkable as to justify some further details.

Grogan, of Pomeroy, foreman of the Dabney Salt Works, was referred to me for treatment of an obstinate sciatica, which had continued for six months, and had entirely disabled the limb. He came into my office on crutches. The limbs had shrunken somewhat. Painful points existed

behind the trochanter major, in the vicinity of the head of the fibula, and near the outer maleolus. A descending labile current from twenty cups of Siemens and Halske was used, the positive pole placed over the dorso-lumbar enlargement of the cord, and the negative passed down the limb over the course of the sciatic and its principal subdivisions. These applications were repeated every day in sessions of fifteen minutes, and at the expiration of two weeks he returned home cured.

Cases of *Posterior Spinal Sclerosis* (*Progressive Locomotor Ataxia*) have lately been reported, in which the constant current gave decided relief to the severe pains which accompany that disorder. My own experience has not been so satisfactory. In two cases of this disease in the second period, I fairly tried currents of various degrees of intensity, but without permanent good result. It is true relief of pain was experienced at the time of the application and for a few hours subsequently, but it then returned with its usual severity. I am able, however, to give details of a case of this singular disease, in the first stage in which the prolonged use of galvanism seems to have effected a cure.

Mr. B——, a gentleman living at Shelbyville, Indiana, three years ago and when forty-two years of age, began to suffer with fugitive pains in the lower extremities. Soon after these pains commenced, he experienced a deep seated uneasiness, with a feeling of constriction in the thighs, some numbness of the feet and legs, satyriasis, tight band-like sensation around the abdomen, slight dimness of vision with presbyopia and occasional giddiness. He next experienced some difficulty in locomotion, but there was not very

marked ataxia at any time. In walking, his limbs soon gave out, and he could not stand steadily with his eyes closed. These symptoms were considered characteristic of the first stage of progressive locomotor ataxia, and the galvanic applications were recommended. For the first year of the treatment, there were made four applications a week, and for the second year two. A current from twenty cups of Siemens and Halske was passed through the spine, and through the sympathetic ganglia and pneumogastric by placing the positive pole in the auriculo-maxillary fossa, and the negative on the epigastrium. Under this mode of treatment, the perseverence of this patient has been rewarded by recovery.

There are some other painful affections under ordinary treatment exceedingly unmanageable, in which the good effects of galvanism are most conspicuous. I refer to the cases of so-called *spinal irritation, ovarian and uterine neuralgia, hysterical migraine, enteralgia,* etc. These several disorders allied by pathological and clinical affinities, frequently occur in the same patient. In the case of young girls and the unmarried, the positive pole of ten to twenty elements should be applied to the points of spinal tenderness, and the negative carried downwards over the lower spinal region and over the iliac and hypogastric regions. In the case of the married, an insulated vaginal electrode may be introduced connected with the negative side of the battery, and the positive be applied to the spine or abdomen or both. Most excellent results, as I have repeatedly ascertained, may be obtained by applying the positive pole to the auriculo-maxillary fossa whilst the negative vaginal

electrode remains *in situ.* In the large number of cases belonging to this type of nervous diseases, which I have treated, I have had no instance in which there was not at least decided improvement.

The foregoing facts are sufficient to show the great value of galvanism as a remedy for *pain.* It can also be demonstrated that it is a most effective remedy for certain kinds of *spasm.* That form of *Torticollis* coming on suddenly after exposure to cold, so frequent in children and nervous adults, is promptly cured by a weak galvanic current. Sometimes a single application of the current from six cups of Siemens and Halske suffices to remove a severe attack. The few cases of *torticollis* of long standing and of *histrionic spasm* which have fallen under my observation, I have utterly failed to cure.

Most excellent results are sometimes obtained from the use of galvanism in *asthma.* I have not been so fortunate as some others in curing cases of this disease, but have in a few instances produced marked amelioration. Four cases of *emphysema* subjected to this treatment resulted as follows: one was very much improved, one was benefitted somewhat, and two were not influenced in any way. A somewhat larger percentage of cases of true *spasmodic asthma* have been benefitted, but I can not report a single cure. During the paroxysms of difficult breathing, the passage of the current usually affords prompt but partial relief. In treating asthma a downward current through the pnemogastric is employed, the positive pole in the auriculo-maxillary fossa, and the negative in the epigastrium.

Some cases of *intestinal spasm* are relieved in a very

marked manner by the constant current. The following case is typical of this affection, and will serve to illustrate the character and the mode of management of the same or analogous affections.

Mr. C——, a citizen of Indiana, aged 26, came to me for treatment. He was much emaciated, and had a cadaveric appearance. His pantaloons were loosely tied about his waist; his abdomen was distended, and he walked with his body bent forward, in consequence, he said, of cramp. He had suffered in this way for a year, and only procured relief by considerable doses of opium. On examination, I found his abdomen distended with gas, exceedingly resonant, and more or less tender to pressure. As the abdominal walls were very thin, it was easy to trace the course of the intestines when his attacks of cramp came on. His bowels were alternately constipated and relaxed. I applied at once a descending current from twenty cups, through the pneumogastric and sympathetic ganglia. The intestinal movements ceased when the current passed, but when an interruption was made, they became very violent. On the following day after this single application, an astonishing improvement was manifest.

2. *Galvanism and Faradism in Paralysis.* It is now perfectly well understood that galvanism and faradism are inadmissible in recent cases of the cerebral and spinal paralyses. After the acute symptoms have subsided, and in cases of slowly developing and essentially chronic disease of the nerve centers, galvanism and faradism may be employed with advantage. I have already given some cases of the latter in which most evident improvement followed, but I

have been especially careful not to claim a cure in any case. Galvanism is employed in the modes already indicated to improve the nutrition of the nerve centers, and faradism to improve the nutrition and to restore the impaired contractility of the muscles. Without further comment on these well understood principles, I pass to consider some special forms of paralysis.

Facial paralysis is one of the forms of the so-called "spinal paralysis" in which the electro-contractility is diminished or destroyed—the degree of impairment in the muscular reaction to the electric current being determined by the extent of injury to the facial nerve. I select two examples of this form of disease most frequently met with.

Mr. ——, a printer, after exposure of his face to a current of cold air whilst perspiring, found on the following morning that he could not close his left eye, nor whistle, nor laugh, except on one side, and that his food collected in his left cheek. This was a simple case of paralysis of the seventh nerve, and a few applications of the interrupted galvanic current restored the symmetry of the face. From the first, the interrupted galvanic current caused distinct muscular contractions, but the muscles did not respond to the faradic current until after the use of the galvanic.

Emma C——, a flaxen-haired child of eight years, suffered from ear-ache, and had a slight otorrhœa, which however disappeared in a few days. After this discharge ceased, she complained greatly of headache on the same side, became very drowsy, and frequently vomited. These symptoms had continued about two weeks, when she complained of double vision, and had convergent strabismus.

There next appeared facial paralysis, with the usual symptoms of that condition. These very serious head symptoms were removed in three weeks by the application of the galvanic current three times a week, and by inflation of the middle ear, performed by my colleague, Prof. Seely. There yet remains some slight convergence, but this will probably disappear under the electrical treatment, which is still continued occasionally.

Three cases of *writer's cramp* have happened under my observation. One of these, of recent occurrence, was cured by a faradic current; one was improved by an interrupted galvanic current, and the third proved rebellious to both forms of electricity. In *lead paralysis* the nutrition and the electro-contractility of the muscles may be so far restored by galvanism that a faradic current will complete the cure. I have happened to have but one case of this disease under treatment, which recovered by the method just described.

3. *Galvanism and Faradism in Gynæcological Practice.* It is very important, I think, to have correct views of the value of electricity in uterine maladies. This department of electro-therapeutics is likely to be much overdone. When I had less experience in the application of galvanism than I have now, I was rash enough to publish some cases supposed to be cured, but which were only improved. Not to waste time in the narration of cases, I will put into the form of aphorisms the results of my considerable experience in the treatment of this class of diseases.

In hyperæsthetic states of the sexual apparatus—as ovarian and uterine neuralgia, irritable uterus, vaginismus—a

descending current gives great relief and is of itself frequently curative.

In chronic metritis with hyperplasia of the uterine tissue, contrary to my formerly expressed opinion, it does little more than procure relief for the time being to some of the unpleasant symptoms, as back-ache, bearing-down pains, etc., which accompany this state.

In simple congestion of the uterus, with descent due to the increased weight, an interrupted galvanic current, or a rapidly interrupted induction current, affords decided relief.

Amenorrhœa of anæmia or the result of defective evolution, is usually cured by a strong induction current, or by the interrupted galvanic current passed through the pelvis. In unmarried women it may suffice to place one pole over the spine and the other over the pubic region, but the results are better when an insulated vaginal electrode is used.

4. *Galvanism and Faradism in the Genito-Urinary Diseases of Males.* Having had no experience in the electrolytic treatment of stricture of the urethra, I am unable to offer any opinion as to the value of this method. The good effects of the galvanic current are very evident in some painful affections of the bladder, as, for example, reflex irritability of the organ. Irritability due to prostatic enlargement, or to disease of the mucous membrane, is increased by galvanism. The so-called "irritable testis" is generally cured by including the affected organ in the circuit and sending through it a weak continuous current. Galvanism is, however, more especially useful in atonic states of the sexual organs. It is very beneficial in that relaxed condition produced by spermatorrhœa. We use it

in this disease to accomplish two objects: to relieve the hyperæsthesia of the prostatic portion of the urethra; and to increase the power of the erections. If the former be our object, and insulated urethral electrode connected with the negative pole is introduced, and the positive is applied to the spine or hypogastric region. A current from four to six elements of Siemens and Halske is sufficient for this purpose. If we wish to excite the erectile apparatus the current must be uninterrupted or the polarity frequently changed. I have myself not been fortunate in the relief of cases of true impotence by electricity in any of its forms. Especially has it failed in the case of men at the middle period of life, in whom the failure of sexual power is the outcome of excessive indulgence, lawful and unlawful.

5. *Galvanism in Diseases of the Skin.* I have already given some facts to show the utility of the constant current in that neurosis of the skin—*herpes zoster.* I have frequently observed that some local eruptions have disappeared from the skin during a course of electrical treatment, and have utilized this observation by making electrical applications to parts thus affected. Ten cases of acne of an obstinate kind have been thus treated with great advantage, all have been more or less benefitted, some cured. For this application I have been ridiculed by some small Cincinnati wits, who have not sufficient knowledge to appreciate the scientific questions involved. With the local application of currents of moderate intensity to the terminal filaments of the fifth pair, I usually conjoined galvanization of the cervical ganglia of the sympathetic to affect by both kinds of impressions the trophic centers.

6. *Catalytic Effects of Galvanism and Electrolysis.* It is no part of my purpose to discuss the numerous and important surgical applications of electricity. There are some of these applications, however, which appropriately come within the province of the physician. I confess to a strong disappointment in the use of galvanism for the cure of chronic indurations of inflammatory origin. I have not been able myself to procure the results which Remak so confidently promised. Rheumatic callosities have been equally rebellious to this mode of treatment. I have already admitted that the catalytic effects which I had appeared to have produced in chronic metritis proved to be fallacious.

Whilst catalytic effects must be regarded at present as uncertain, the process of electrolysis is developing into the greatest usefulness. In order to illustrate the use to which we may apply the electrolytic decomposition, I beg to try your patience with the narration of another case.

Mrs. R——, a lady of 35, living in Indianapolis, came to be treated for an enormous goitre which had existed for twenty-five years. The neck measured twenty inches in circumference. As all the usual measures had been tried unsuccessfully and as the goitre was partly cystic, I advised electrolysis. I introduced the needle connected with the negative pole into various parts of the tumor, and applied the sponge of the positive pole to the opposite side. Commencing with a current from twenty cups, I increased to forty. This produced great burning, flashes of light, and giddiness, but was otherwise well borne. A daily session of ten minutes was given to the application. After three weeks of treatment she was sent home, and advised to

return at the expiration of a month. When she presented herself again, the neck measured fifteen inches, being a reduction of five inches. She was again submitted to the same treatment, with, however, the difference that two needles were sometimes introduced, one connected with the anode, the other with the cathode. A further reduction in the volume of the tumor has been made, but a period of several weeks will be necessary before the exact diminution can be ascertained. She will return for further treatment. I am confident that success will be finally achieved even in so unpromising a case, for it is well known that electrolysis is, as might be expected, more successful in recent cases.

I beg now to bring my rather desultory remarks to a close. My object was to present the practical side of electro-therapeutics as it appears to a single observer. You will perceive that I do not regard it as a panacea, but as a remedy of great utility having its distinctive place as any other therapeutic agent, and a power which we may use or abuse in the treatment of disease.

The Detection and Semeiological Value

OF

Yellow Elastic Tissue in Sputum.

BY A. T. KEYT, M.D., OF WALNUT HILLS, CIN.

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The discovery of the yellow elastic tissue in sputum has usually been accredited to Prof. Shroeder van der Kolk, at the date of 1846. It has, however, been claimed for Dr. Andrew Clark, that he too made the discovery independently about the same time. The true value of this addition to our means of diagnosis in pulmonary disease is the object of this paper to set forth; and as conducive thereto, I will present,

1st. The microscopic characters of this substance as seen in sputum, with its appreciation and availability as a sign of disease.

2d. The structures that normally contain it, and the conditions of disease which from their nature and seat must furnish it.

3d. Estimates and clinical results from various sources, with comments, observations, conclusions.

1st. A particle of the yellow elastic tissue from sputum placed under the microscope presents well defined charac-

ters; the fibres pale and slender are curled and curved, and in bands are waved and arranged in a manner unlike any other substance. Beale says: "The microscopical characters are distinct; the structure can not be confounded with anything else met with in sputum." * * "The elastic tissue is not prone to change. It can hardly be mistaken for any other structure, and is detected with the greatest facility, especially if the sputum be treated with acetic acid, which renders the other elements transparent, but has no action on the elastic tissue." This distinguished microscopist, in his admirable work, "The Microscope in Medicine," has furnished some excellent plates of fragments of pulmonary tissue found in phthisical sputa which well show the distinctive appearances.

Dr. Fenwick states: "There is no difficulty in distinguishing the elastic tissue of the lungs from other matters that may exist in the expectoration. It is often found clinging to filaments of hair, silk, etc., but in all cases the fineness of the fibres, their regularity, and the dichotomous division render detection certain and easy." To my mind, it is as distinctive and readily recognized as a pus or a blood corpuscle; nor are certain forms in urinary sediment more readily and certainly recognized, as uric acid, triple phosphates, or tube casts, than are these fragments in sputum as elastic tissue.

By what procedure do we detect this characteristic structure when present in sputum? The old method was to spread out the sputum in a thin sheet on a glass plate and then pick out the likely-looking little opaque particles and transfer them to the slide of the microscope for examination.

The observer is sometimes fortunate in thus finding the tissue in the particles first submitted; oftener, however, he spends considerable time before he can find it, and not unfrequently it entirely eludes his search even in expectoration which contains it in no trifling amount.

The method introduced by Dr. Fenwick is far superior, and seems to leave nothing to be desired. This consists in liquefying the sputum by boiling it in a solution of pure soda, fifteen grains to the ounce of water. It is thus thinned and rendered transparent, and when poured into a conical glass the elastic tissue settles to the bottom, whence it can be removed with a pipette and placed under the microscope for inspection. Liquor potassæ can be used instead of the solution of sodæ, giving the same result. This process greatly facilitates the detection of the tissue, as it will be found that if the materials contain no foreign admixture, the sediment will be small and consist almost wholly of this structure. It enables us to detect very small quantities; and, indeed, before its introduction, these examinations must have been tedious and unsatisfactory in a high degree. In order to test the accuracy and delicacy of the process, Dr. Fenwick performed a number of experiments, of which he gives the following:

One-tenth of a grain of lung tissue was divided by needles into ten parts, and the one-hundredth of a grain thus obtained was placed in the expectoration of a person affected with bronchitis, it having been proved by previous examination to contain no elastic fibre. The mucous was liquefied by boiling it with a solution of pure soda, and the mixture then poured into a conical-shaped vessel. The

particle of lung was easily removed and recognized by the microscope. Then he remarks, "But as the one-hundredth part of a grain of lung consists of from twenty to thirty air-cells, and as the presence of the elastic fibre can be determined with the greatest accuracy by means of the microscope in half or even in a smaller part of a cell, it is evident that it might be possible in this way to detect the $\frac{1}{4000}$ or the $\frac{1}{8000}$ part of a grain of pulmonary structure in the sputum of persons affected with phthisis; such minuteness is, however, never requisite, as we need no more expect to meet with a part of an isolated air-cell in the expectoration, than to be consulted by a patient with a single tubercle in the lung." Then, if the elastic fibre be present in a specimen of sputum, we have the means of detecting it easily and certainly, even though the amount be extremely small. But frequently the number of fragments that may be thus detected is very large. Dr. Fenwick counted eight hundred in one specimen coughed up in twelve hours; and often fifty or sixty fragments were detected, where from the stethoscope signs alone no great destruction of lung could have been anticipated!

Not to find the tissue when diligently sought for by this process comes to have a high negative value; for if not found, we reasonably conclude that the sputum does not contain it, and so far that the patient is not suffering from the conditions which are known to yield it.

For satisfactory examination it is usually desirable to procure a considerable quantity of the expectoration, though in some cases a single pellet will furnish all the evidence required.

It is thus seen that the presence of the yellow elastic tissue in sputum may be determined with facility and certainty by any one accustomed to its appearance and the process of seeking it. It, then, becomes a palpable sign of certain conditions which produce it. This sign is distinct and available to those who understand it; and the uninitiated can learn it as easily as they can learn the important physical signs of pulmonary disease. The appreciation of crepitant ronchus, tubular breathing, pectoriloquy, etc., requires study and practice. The beginner listens with confusion and uncertainty until he catches the true sounds with such appreciation and vivid perception that he ever after remembers and can recognize them; so he who would learn the sign of the elastic tissue studies and examines his specimens with more or less perplexity until the true characters become fixed in his mind so that he can not mistake it. The difficulty in the latter case is no greater than in the former.

Though the appreciation of this sign must be acquired mainly by the study of the appearances of the elastic tissue obtained from the lung itself and in true specimens seen in sputum, yet much advantage will be gained by the study of the appearances of other bodies met with in sputum, which have points of more or less resemblance to this structure. Such resemblances will, at times, be traced; in mucous, arranged in curved bands and streaks; in the aggregated outlines of a batch of large buccal epithilial cells; in particles from the food, as the fibres of lettuce, radishes, cucumbers, etc.; also in particles of cork softened and macerated in the alkaline solution, and presenting in its meshes

and boundaries (allowing for the smaller size,) something of the appearance of the elastic trabeculæ of the air-cells.* Early familiarity with all these appearances under the microscope is very desirable, as protecting against ludicrous mistakes, and contributing to the appreciation of this sign of disease.

Two hundred and fifteen diameters is a sufficient and a convenient power for these investigations, though four hundred diameters gives a finer delineation of the individual fibres. The objection to the use of the higher power is that the field is smaller, and the search accordingly more tedious.

Having thus considered the first division of our subject, we come to the

2d. *The structures which normally contain the yellow elastic tissue, and the conditions of disease which from their nature and seat must furnish it.*

According to our best anatomists and histologists, the yellow elastic tissue, in general terms, is a component part of the structure of the larynx, trachea, bronchi and bronchial tubes; that it enters largely into the composition of the terminal bronchial tubes and air-cells, and that it exists in large proportion in the subserous areolar tissue which invests the entire lung and extends inwards between the lobules. In the trachea, the elastic fibres are situated beneath the mucous membrane, inclosing the entire cylinder, but most abundant in the posterior part, where they are collected into longitudinal bundles. "The orico-thyroid membrane is composed mainly of yellow elastic tissue." As is well

* The cotton fibre, too, is considered by some observers to most closely resemble the elastic fibre, but is distinguished by being coarser, more opaque, not divided dichotomously, and not characteristically curved.

known, the mucous membrane lines the entire pulmonary passages from the air-vesicles outwards.

More particularly, Dr. A. T. Waters, of Liverpool, states: "The walls of the air-sacs and alveoli are formed of yellow elastic tissue, a basement membrane, and an epithilium, together with the capillary vessels constituting the pulmonary plexus. The fibres of the elastic tissue are arranged in bundles and singly. They are found surrounding the mouths of the air-sacs, running through their walls in various directions, and encircling the alveoli." So much for the natural situation of the tissue. Now the conditions of disease which afford fragments of the elastic fibre in the sputa, must be such as affect these structures in which the tissue resides with destructive action. It is plain it can only appear in the expectoration when in some of these situations it is disintegrated, and then propelled through a broken or destroyed contiguous mucous membrane into the passages which lead externally. *Idiopathic bronchitis* can not produce these fragments, because this disease involves only the mucous membrane, which everywhere interposes between this tissue and the interior of the tubes. Even extensive suppuration may take place in the membrane and yet the elastic fibres remain intact. Nor will ulceration of this structure be likely to disturb them, as plastic matter at the base of the ulcers would limit penetration, and prevent destructive action at a depth to involve the tissue.

Ordinary *idiopathic pneumonia* in the nature of the case can not be expected to afford the tissue in its sputum, for it involves no disintegration of lung texture. The leading features of favorable cases are congestion, exudation of

plastic matter, resolution and restoration of the organ to its pristine condition, no portion carried away in the expectoration. Neither will *chronic pneumonia*, unless degenerating into a condition that would change its name, yield in its sputum this product of decaying pulmonary texture. In all these inflammatory conditions and their results, excluding the idea of phthisis, and some other processes to be specified, the sputum must be absolutely free from disintegrated elastic tissue.

Ulceration involving the textures beneath the mucous membrane, with points communicating with the open pulmonary passages, fulfills the conditions by which fragments of the fibre may gain access to the sputum. This, if seated in the structures of the windpipe, might throw off a minimum of fibre which if caught in the sputum to be examined, might be demonstrated. While admitting the possibility of this event, yet, as matter of fact, it is not worthy of consideration, because, the *tubercular* form is that which is the most extensive and persistent; and if, perchance, it should make its contribution, it would only be a more extended application of this presence to the conditions of phthisis. The *syphilitic* form is next in frequency, but this would be so marked by characteristics that the sputum would not be interrogated for this element. The simple *idiopathic* form is of such infrequency and limited extent when present, and moreover the times in which fragments could find their way into the sputum are so distant and uncertain, that it may be considered that the tissue would never be found under such circumstances.

Idiopathic ulceration and abscess of the lung must yield

the tissue, since they involve destructive action in the midst of textures composed largely of it; but here again it will appear that the practical bearing of this fact amounts to just nothing. Destructive ulcerative action in the lungs not pertaining to phthisis, is of rare occurrence. Inflammation usually terminates in resolution without ulceration; failing in this, it determines the speedy death of the patient, or degenerates into phthisis. The smallest possible place is thus left for simple ulceration. Then, again, when present, we must consider the improbability of a given specimen of the sputum containing the fibre, inasmuch as it could only be furnished at the active stage, which would soon pass and be followed by the healing process that would effectually stop the elimination.

Persistent ulceration from foreign bodies in the lungs, whether introduced by the way of the windpipe, or projected through the walls of the chest, is a very favorable condition for the production in the sputum of the elastic tissue; and yet in a practical sense, the opportunities of finding it in these connections need scarcely be counted upon. Other possible sources of the tissue might be mentioned in gangrene, and in cancer of the lung; but such derivation is plainly without clinical significance.

The important point in the investigation is now to determine from a consideration of the nature and seat of *phthisis pulmonalis* its relationship to the presence in the sputum of the yellow elastic tissue. It may be important to premise that in the present treatment I shall follow the broad pathology of Williams in embracing under the name "pulmonary phthisis" those degenerated inflammatory products

with the involved conditions termed "caseous pneumonia," as well as tubercular disease in its strict signification, and that I may use the terms "tubercle," "tubercular," as convertible with "phthisis," "phthisical," in this broad sense.

Dr. Waters writes:* "The principal seat of tubercle in phthisis is the air-sacs of the lungs. The tubercular matter is poured out from the blood-vessels and deposited in these cavities. It is also sometimes found in the smaller bronchial tubes. I have frequently examined lungs in the early stages of this disease, and have been able to pick out with the aid of the dissecting microscope, small tubercular masses having the shape and form of the air-sacs, to which the tubercular matter had been moulded." According to Dr. Radclyffe Hall and others, tubercles are first deposited in the interior of the air-cells, and subsequently in the intercellular tissue of the lungs; and others again locate the deposits within the texture and on the exterior surface of the air-vesicles. All agree, however, in this—that the tuberculous matter is deposited in most intimate association with the air-cells and smaller bronchial tubes.

Another well established fact is that the tendency of tubercles proper and degraded inflammatory products, ("phthinoplasms,") is towards softening and disintegration. On the manner of initiation of the process of softening, pathologists are again divided. But, whether it originates from degeneration within or from destruction without the deposits, our purpose is served; only, if the distinction were pure, we might expect in the latter mode of origin, earlier manifestation of lung disintegration. In the progress of

* Work on Consumption.

phthisis, this softening has its commencement, it may be, in a few points, which soon multiply and extend until the case assumes the usual characteristics of the second stage; and the process continuing, the cavities enlarge, until the case presents the signs of the third stage, or the stage of cavity. It is evident that these so-called stages of phthisis are entirely arbitrary. Each of the last two includes the others; and so the first includes the others, for a time longer or shorter, before the advent of the usually accepted manifestations of softening. In reality, there are but two stages—deposition and softening, but the early transition can not be distinguished by the usual indications, and in most cases softening is in progress for a considerable time while the case still passes as in the first stage.

This softening and disintegration of phthisical deposits necessarily involves the destruction and disintegration of the very delicate structures with which they are so intimately blended. A mass of deposit, however small in disintegrating, must tear and fret away the walls of the air-cells and minute bronchial tubes in which it is imbedded; and this is all the easier since they too are in process of decay. The softened material of every such mass must contain the *detritus* of these organized structures; and the softening of larger masses must occasion a correspondingly larger destruction, and yield to the products a proportionately greater amount of disorganized lung tissue. The collections will not long remain imprisoned, but by ulceration and destruction of intervening textures, soon find their way into pervious bronchial tubes, whence, mingling with the secretions they pass onwards and are expelled in the sputum. In progres-

sive phthisis, these collections of variable size are continually forming and discharging, so that the expectoration must as constantly be charged with the products of disintegrated air-cells, bronchial tubes, and interstitial pulmonary tissue. The true representative of these products in the sputum, *is known* to be the yellow elastic tissue. Indeed, it were inconceivable that this definite structure of peculiar and not easily perishable fibre and entering so largely into the composition of these lung textures, if this should break down and be cast off in the expectoration—that this structure, under such circumstances should not therewith uniformly present its characteristic fragments.

From such considerations, therefore, do we conclude that in the destructive stage of phthisis, the yellow elastic tissue derived from the pulmonary textures is constantly, or at frequent intervals, being contributed to the sputum. By the destructive stage I would imply phthisis in progress from the beginning of softening in the earliest deposits onwards to the end. The commencement of softening has heretofore not been fixed with any precision, nor have we been in possession of any indications by which it could be determined. The naked eye appearances of the expectoration, once relied upon, are now known to have no value worth considering. There is, however, good reason to believe that in most cases of phthisis, this sign of disintegration of the lungs would be among the earliest manifestations; also that in a proportion of cases it would be the first distinct sign of the disease. Tubercles are known to exist for a time without manifesting their presence by the usual symptoms; they are likewise known, after their form-

ation, to usually tend towards decay and disintegration. Under such conditions it is to be expected that in some cases the tubercles first deposited will soften and carry the products with the involved lung tissue into the first expectoration, so that the appearance of the elastic tissue in the sputa would be the first definite indication of phthisis; and that in other more numerous cases where the time is prolonged until other signs and symptoms become manifest, though still pointing to the so considered first stage, this certain sign of tissue disintegration would also be distinctly present. Such early application of this sign of phthisis, I consider to be in exact accordance with the teachings of a correct pathology.

3d. *Opinions and estimates with clinical results; comments, observations, conclusions.*

Dr. Andrew Clark, in an article published in the "Transactions of the Pathological Society," (volume vi, page 74,) describes minutely the microscopic characters of twenty odd specimens of phthisical sputa, with the object of showing the aid that may be afforded by the microscope in diagnosing tubercle, and moreover in determining the tendency of the disease — whether towards rapid disintegration or towards cure.

Dr. Theophilus Thompson pursued the same line of observation (Lancet, 1854, volume ii, page 278; also, 1857 volume ii, page 214,) with what he considered obvious and practical result. These acute observers considered that they could read in the molecules and corpuscles in the sputum whether consumption existed or not, and if so, whether the disease were in active progress, or otherwise in abeyance

and process of cure. They also described modifications of the elastic tissue found in phthisical expectoration, answering to these opposite tendencies, for instance, in the more favorable, the fibre as opaque, brittle and unbent; in the unfavorable, as transparent, tenacious and well curved.

It is obvious that such refinements, whatever their uses might be, could only be appreciated by those having the skill and devotion of these eminent cultivators; and as this can be expected of but a precious few, the application must ever be extremely limited. In marked contrast is the simple detection of lung tissue in the sputum, an easy and eligible process, to which all well qualified physicians may be equal, of unequivocal import and of the widest application. It is observed that though these careful examinations were conducted with reference more especially to the appearance under the microscope of the molecular and corpuscular elements, yet the elastic tissue is mentioned as present in nearly all the specimens, showing that this structure so abounds in phthisical expectoration that when careful examinations of it are being made for other objects than the detection of the tissue, the latter is pretty sure to come into the field and press its recognition.

But Dr. Andrew Clark gives us other testimony, (see the American Journal, new series, volume xl, page 240, copied from the British Medical Journal, April 21st, 1860): "The physician can confidently declare that phthisis exists when he finds the elastic trabeculæ in the sputa. * * * The microscopic examination of sputa enables us to detect softening tubercle in the progress of elimination, which could not otherwise be detected; it confirms or corrects the diag-

nosis between phthisis, dilated bronchi, chronic bronchitis, etc., and it determines the actual progress of the lesion of the lung. * * * In conclusion, allow me to state my conviction that the detection of the yellow elastic tissue of the air vesicles in the sputa is *one of the great discoveries rendered to pathology by the microscope.*"

The high ground of this declaration is noticeable. How much medicine owes to the microscope is so significant as to need here no illustration. What would pathology be to-day without the rich results of microscopical investigation? To rank the discovery of the elastic tissue in sputa among the greatest of *these* by an authority so able as Dr. Andrew Clark, is at once a valued testimony and tribute to its worth.

Dr. L. M. Lawson ("A Practical Treatise on Phthisis Pulmonalis,") writes: "In doubtful cases of bronchial irritation these microscopic elements (tubercle corpuscles and elastic tissue) afford unequivocal means of diagnosis, and in the absence of well-defined physical signs become highly important. * * The elastic tissues are derived from the terminal bronchial tubes in which destructive action has commenced; and while it may be admitted that any condition in which ulcerative action occurs, might produce these fragments of elastic tissue, it is, nevertheless, so far as known, peculiar to tubercular disorganization." This was written about twelve years ago, and in recent researches among everything I could find published on the subject, I met with not a single instance in which these fragments of elastic tissue were found in any other than tubercular disorganization of the lungs. And herein lies one of the strong points of this sign. Other important signs there are of

phthisis, but of no one of them can it be said, "so far as known it is peculiar to this disease." Even dry crackling, which was so significant to Lawson, that he was disposed on the evidence of his own observations, to regard it as peculiar to tubercular exudation, is well understood to represent also other pathological conditions.

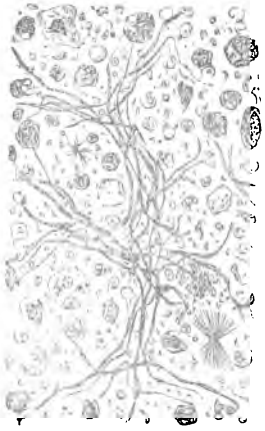
To proceed with the testimony, Beale discourses as follows: "It is, however, most important that the practitioner should be familiar with the characters of one structure sometimes met with in phthisical sputum, which has been cursorily alluded to already. The recognition of this is really a subject of the greatest practical importance. The microscopical characters are distinct; the structure can not be confounded with anything else met with in sputum, and the diagnosis to which the practitioner is led even at a very early period, before the patient or his friends have the slightest suspicion of serious disease, will be in almost every case in which the structure is observed, but too painfully correct. I allude to the very important observation of Professor Schroeder van der Kolk of the presence in the sputum of the elastic fibres of the pulmonary tissue at a very early period of the disease. * * Its presence shows that disintegration of the walls of the air vesicles has actually commenced. * * Dr. Bennett mentions a case in which this elastic tissue was met with at a time when no other signs of phthisis were present. * * After a time other symptoms of the affection manifested themselves, the physical signs of a cavity became distinct, and the patient died. Figs. 233, 234 and 235 are copies of fragments of pulmonary tissue found in sputum which contained a very

COPIED FROM BEALE.

Fig. 232.

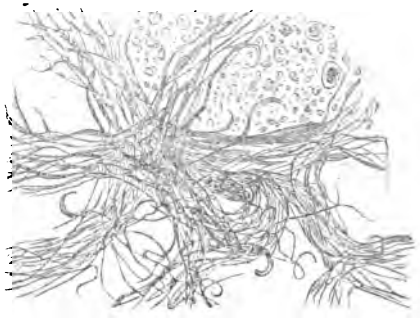
Fragments of lung tissue from a case of phthisis of about a year's duration. *a* Mucus Corpuscles and granular matter. x 120.

Fig. 234.



Fragments of pulmonary tissue from sputum. x 215.

Fig. 233.



Fragments of air cells, with elastic tissue from sputum. From a case of phthisis in which physical signs were not at all marked. x 215.

Fig. 235.

Fragments of lung tissue from sputum. x 215.

1000th of an inch ⌴ x 130.
" " " " ⌴ x 215.

[To face page 144.

large quantity. The amount of expectoration was very small, amounting to not more than a half dozen pellets in twenty-four hours. The case was that of a stout lady of about fifty years of age, who had been suffering from cough for about six weeks, consequent upon taking cold. There was slight dullness under one clavicle, but no marked symptoms of phthisis; in fact, it was difficult to persuade the patient that there was anything the matter with her, and the diagnosis rested almost entirely on the fact of the presence of the pulmonary elastic tissue in the pellet of sputum which was submitted to examination."

This is a very distinct deliverance, and presents very strongly the point of the early appearance of the elastic tissue in the expectoration of phthisical patients; and the fact that if this sign be present the diagnosis can be made, even though other important indications are absent.

The diagnosis of consumption at an early stage, I confess in my experience has been attended with notable and serious difficulty. The ordinary signs and symptoms are so much in common with it and other diseases, as bronchitis, subacute circumscribed pneumonitis, especially of the apex, pleuritis with circumscribed adhesion and exudation, typhoid fever with its pulmonary phenomena, that after collecting and weighing all the data at my disposal, I have been obliged to wait for further developments before making a positive diagnosis. To me the great need was some distinctive sign by which could be known whether the case were phthisis, or one of these more hopeful forms of disease. So evident and palpable has been this want, and so many and great are the interests which hang on the ability to make an

early diagnosis in tubercle, that I regard this as one of the great desiderata in medicine. How far the sign of the elastic tissue may contribute to this achievement we continue to inquire.

Niemeyer writes: "Although the sputa of consumption are mainly the products of the catarrh which complicates the disease, yet they may exhibit certain peculiarities which serve materially to help the diagnosis. * * * Should microscopic examination reveal that the deep yellow, sharply defined streaks above referred to, contain elastic fibres, recognizable through their arrangement and curve as belonging to the air-cells, we know that the event has happened which the appearance of such sputa would lead us to dread, The profuse formation of cells has extended from the surface of the bronchial mucous membrane into its walls and the parts surrounding. *The discovery of such elastic tissue is a sure sign of phthisis.*" The last sentence is italicized by the author quoted.

Dr. C. J. B. Williams, describing the tendencies of deposits resulting from severe and prolonged bronchial inflammation, says: "Such cases may terminate favorably or unfavorably, according to whether the lung texture to which the deposit has reached does not or does participate in the decay and disintegration by which the deposits are removed. If the lung does break down, fragments of its tissue may be found in the expectoration when carefully examined by the microscope, and signs of softening and excavation will become apparent in the affected part of the chest. Yet I can recollect several instances of deep-seated bronchitis in which the signs of lung consolidation threatened the de-

struction of its texture, but they have been completely removed after free expectoration of a quantity of very ugly looking opaque matter, differing in no particular from phthisical sputa except in the absence of filaments of lung tissue."

Again, the same author in connection with the removal by expectoration of the deposits of pneumonia, remarks: "When it does occur, it gives us some insight into the changes of these products which accompany their dispersion, and in the bland inadhesive quality of the sputa, with a diminution of the viscid and saline constituents, and an increase of the granules and fat, we can trace a resemblance to the process of fatty degeneration and disintegration of larger deposits; only in the latter case the lung tissue is involved in the decay, whereas in the case under consideration the matter expectorated contains the exudates only, and shows no fragment of lung tissue under the microscope."

As the diagnosis in nearly all cases lies between conditions of one or other of these diseases, and the conditions of phthisis, the broad ground covered by the direct statement of this eminent author is apparent; and if, indeed, it be true, of which the evidence accumulates, that the microscope can make this important distinction, we have attained a proficiency in diagnosis most flattering and hitherto unknown; for all are aware that in many such cases all other indications—signs and symptoms combined—only leave the physician in doubt and uncertainty as to their true nature. If the microscope can clear up these cases by simply revealing the presence or absence of lung tissue in the sputum, then does this sign of phthisis rise superior not only to any

—the most distinctive—physical sign, but to all signs and symptoms together.

Dr. Fenwick included in his paper (see Med. Chir. Trans. vol. xlix, page 209,) the results obtained from the examination by the microscope of the expectoration of one hundred real or suspected cases of phthisis.

"In thirteen out of twenty-three cases in which tubercle was suspected to be in the first stage, lung tissue was found in the sputum. In seven of the twenty-three cases there was no physical sign of tubercle, but its existence in the lung was suspected from general symptoms only, and in the expectoration from these there was no pulmonary tissue.

"In sixteen cases auscultation and percussion afforded indications sufficient to justify the suspicion of the existence of tubercle, and in thirteen of these lung tissue was found in the expectoration. Of these cases in which it was absent one had suffered from hæmoptysis, and the physical indications were a doubtful deficiency of resonance under the right clavicle, with feeble inspiration; ronchus existing in other parts of the chest. Another had been ill six years, and there was deficient resonance under the right clavicle, with feeble inspiration. The third had suffered from hæmoptysis, and presented harsh inspiration and prolonged expiration under the right clavicle.

"The microscope is, therefore, in this stage a most valuable adjunct to auscultation, as it shows that in the majority of cases in which the physical signs of the existence of tubercle are present, softening of the deposit has already commenced and lung tissue in small quantities is being expelled. Nor is it of less value when it proves that no

ulceration is taking place, for such a fact should induce us to look hopefully upon such a case, and should encourage us to persevere in our endeavors to ward off attacks of inflammation."

There were twenty-four cases in which the physical signs indicated softening of tubercle in the lungs, and in all pulmonary tissue was present in the sputa. In fifteen the physical signs were of a doubtful nature, and seven of these presented microscopic evidence of ulceration of the lungs.

"In thirty-five cases the stethoscope indicated cavities, and in all these there were fragments of lung tissue in the expectoration. In two cases enlarged bronchial tubes were diagnosed, and in neither of them was there any appearance of elastic fibre in the sputum."

This paper of Dr. Fenwick's embodies a store of facts the largest and richest in the literature of the subject. Take his cases diagnosed in the stage of softening and in the stage of cavities, fifty-nine in all, every one of which furnished the elastic tissue. Now in the nature of the case we can not reasonably expect to find the tissue in any other condition than in phthisis; moreover, I believe I am safe in saying that the announcement has yet to be made that it has ever been so found. Accordingly the converse should hold that of fifty-nine cases in whose sputa is found the elastic tissue every one shall be a case of phthisis. His observations indicate the importance of this sign in the so-called first stage, and that at a time when physical signs become manifest, disintegration of the lung is in progress in a large proportion of the cases. And, indeed, the proportion may even be larger than thirteen out of sixteen cases,

as given, because the three cases in which the tissue was absent, as narrated, leave the impression that they were not one and all conclusively cases of phthisis.

The fair inference, then, from these facts contributed by Dr. Fenwick is that true consumption in its manifest stages, whether of deposition, softening or cavity, furnishes the elastic tissue in the sputa of all its cases except a small proportion of the so-called first stage, and these latter, most probably, marking inactivity of the disease at the time of the examination. Bearing in mind the extreme improbability of the appearance of the tissue in any other condition, where, let me ask, in the domain of the semiology of phthisis can we with reason infer as much of other sign or symptom?

I have thus endeavored to present such opinions and clinical facts bearing on the subject as I have been able to collect. It will be noticed that these are from well-known authorities — men accepted as accurate observers and interpreters of the phenomena of disease. The testimony as a whole accords a very high diagnostic value in determining the existence of tubercle to the presence in the sputum of the yellow elastic tissue. Wholly adverse testimony I have not found. The lowest estimate of this sign of phthisis is by Dr. Da Costa, (Medical Diagnosis, p. 256,) who writes:

"Yet the microscope does not aid us very much in the diagnosis of phthisis. The only appearances in the sputum at all distinctive are fragments of the pulmonary fibrous tissue and the so-called tubercle corpuscles. But though from the presence of the former we are sometimes enabled to suspect the existence of consumption before the physical signs of even its early stages are well defined, we can never

be quite certain that the breakage of the lung texture is due to tubercular disease." Contrast with this the italicized declaration of Niemeyer, "*The discovery of such elastic tissue is a sure sign of phthisis,*" and then let it rest until the author investigates the subject anew, when, I am confident, he will be constrained to add his name to the distinguished list of those who teach the importance of this sign of phthisis.

After such an array of names and experiences, I almost shrink from presenting any observations and facts of my own. However, for a few years past I have been accustomed to look for the elastic tissue in the expectoration of such patients with symptoms of phthisis as would fall under my care in the pursuit of a general practice. I have kept records, more or less complete, of twenty such cases. Of these, sixteen cases furnished tissue in their sputa; and of the latter, twelve died of phthisis. Of the remaining four, one, a lady twenty-six years old, is now in the last stages, with a large cavity in the left lung and extensive implication of the right. Another, a woman about thirty-three years old, examined first three years ago, when the lung tissue was discovered in her sputum, and her case was diagnosed consumption by a competent consulting physician on the strength of the physical signs, is yet living in tolerable general health, carrying the indications of chronic phthisis. A third is a man thirty years old who presented himself last winter with symptoms and physical signs of phthisis and expectoration which was found upon examination to contain a large amount of lung tissue. He is still about, bearing the marks of the "fell destroyer." The fourth case

is *unique*, because it is the only case I have met or of which I have read where the elastic tissue was found to be present in the sputum and the case proved to be other than phthisis. As such it possesses a peculiar interest, and its record here comes fitly in place.

Belle ——, aged five years, previously healthy, began in the spring of 1870, to suffer from cough, embarrassed respiration, and more or less febrile movement. The case was first regarded as bronchial irritation with asthmatic complication. After a time the urgency of the symptoms subsided, but the difficulty did not clear up, and there followed a series of exacerbations and remissions, until in the following autumn, when was manifest extensive consolidation of the upper portion of the right lung. She had greatly failed in flesh and strength, and at times expectorated freely muco-purulent matter. After this she continued to decline, and presented increasing local mischief.

In March, 1871, her condition was noted as follows: countenance pinched and cadaveric, body greatly emaciated, strength gone, no appetite, apparently no digestion or assimilation, skin febrile, pulse rapid, small and feeble, respiration greatly accelerated and at times laborious, cough harassing and attended with copious muco-purulent expectoration, emitting a peculiar fetid odor. Physical examination of the chest revealed diminished expansion and dullness with tabular breathing and various *rales* over the upper portion of the right lung, and a very clear percussion note, with a somewhat exaggerated vesicular sound over the left lung, also at a point over the right apex in front and behind cavernous respiration and gurgling were distinct. *The sputum*

was carefully examined under the microscope on two occasions and both times the yellow elastic tissue was found. Dr. A. B. Isham also examined the specimens, and verified the presence of this structure.

A few days after this, in a sudden fit of coughing, attended by retching and expectoration, the child expelled into the hand of the mother a hard body, which proved to be a brass charm in the form of an ear of corn with pointed projecting angles, and measuring in length nine-sixteenths of an inch, in greatest breadth five-sixteenths, and in thickness three sixteenths of an inch. It was then remembered that a friend had given this charm to the child a little while before her commencing illness, and that, as accounting for its disappearance, she said, "she had swallowed it," also that she had frequently said "it was the fish" (as she called it) "that made her cough and breathe so." But it was thought she was "only talking," and no further notice was taken of it. The offending body being thus expelled, the improvement in the case was rapid, and not many weeks elapsed before the child was restored to perfect health, and so she has happily remained to this day.

This case, then, is the only one of the sixteen furnishing the elastic tissue which proved to be not phthisis, and though of exceeding interest as perhaps the only case yet produced marking the presence of the elastic fibre in the sputum of a patient suffering from non-tubercular ulceration of the lung, yet the event of such cases would be so rare that really this one deserves no place among my sixteen cases, nor is the rule disturbed that in sixteen or fifty or a

hundred cases furnishing the tissue we shall have the same number of cases of phthisis.

Of the cases yielding the fibre, a few were in the first stage, and the majority presented inadequate physical signs, so that the diagnosis was made more from the fact of the presence of the elastic tissue than from all the other indications.

A sadly interesting case was that of a young lady twenty-one years of age whose illness commenced as a bronchitis, and six weeks later there were no signs or symptoms in her case beside persistency, which would not belong more to bronchitis than to phthisis. At this time her sputum was examined, and found to contain fragments of pulmonary elastic tissue. Her case ran the course of consumption, terminating fatally in about a year.

The following is a fair representative case:

Mrs. ——, aged twenty-six years, has been in poor health about four months from date June 15, 1871. She has suffered from rheumatism, cough and expectoration, pains in the chest, chills, fever, perspirations. She is now much reduced in flesh and strength. The left lung at the apex in front is not equally resonant with the right, and the respiratory murmur over this part is feeble, with a faint, prolonged expiratory sound; posteriorly is heard over this apex a more distinct prolonged expiratory sound. Altogether the physical signs are slight.

I well remember my doubt as to the true character of this case until I had tested the sputum. On finding there most perfect specimens of yellow elastic tissue my diagnosis of phthisis was promptly and positively made. Its correctness

has been proved by the subsequent progress and developments of the case.

To trace the cases in which phthisis was suspected, but no tissue found, the first was—

Mrs. ——, aged thirty-five years, who had been delicate for many months, and was suffering from pain and tenderness over the upper part of the right lung, cough and a scanty expectoration, irregular chills, fevers, weakness, etc. The only physical signs were, over the right front a jerking inspiratory, and a prolonged, somewhat rough, expiratory sound. The sputum was examined for lung tissue without any being found. This case was noted a year ago, and since then the history has entirely negatived the idea that she was affected with phthisis.

The second case came under my care on the 23d of July last, from the hands of a homœopath, who had called her disease by a variety of names. She was about thirty five years of age, and had been ill for several weeks. She was emaciated to an extreme degree, having reduced from 112 to 76 pounds. She had cough, and a very profuse mucopurulent expectoration, sharp pain in the chest, a red glazed tongue, short, frequent respiration, a feeble, rapid pulse. Over the left lung were heard the various ronchi, and a rough, irregular respiratory murmur. The whole aspect of the case was that of acute consumption. I procured a specimen of her sputum, treated it in the usual way, placed the particles of sediment under the microscope, searched carefully but found no elastic tissue. This was not as anticipated, nor was it conclusive to my mind of the absence of the tissue. I, another day, obtained more of the sputum,

and subjected it to a most diligent and exhaustive examination, also I was joined in the search by Dr. Isham, but with the same negative result as before.

August 31*st.*—Since last report patient has greatly improved in flesh and strength; expectoration has ceased; no rales. The indications of phthisis have all vanished. The lady continued to improve, and in a few months she was restored to her accustomed health.

In this case, the revealed absence of lung tissue from the sputum saved me from making the diagnosis of rapidly progressing phthisis, and thus committing a very great blunder.

The third case was in a gentleman of twenty-eight, who presented himself last winter for examination, with a thin, delicate aspect, slight cough and scanty expectoration, and a history of an attack of hæmoptysis a few years ago. Examination of the chest revealed nothing definite—a slight lack of resonance over right apex, and a somewhat rough and interrupted respiratory sound. No elastic tissue could be discovered in a small parcel of his sputum subjected to examination. Up to this date he has betrayed no further indications of tuberculosis.

The fourth case was that of a boy fourteen years old who fell under my notice last summer. He was in the last stages of chronic suppurative phthisis, having been afflicted with this disease for several years. His expectoration was very copious and almost entirely purulent. I made one not very searching examination of some of his sputum without the discovery of elastic tissue. I intended to make a second search, but it so happened I did not. This boy since died of phthisis. In an old standing case of consumption in

which there is free suppuration it is easy to understand that the tissue could be absent in one parcel of sputum and present in another; and hence the importance of repeating the examination when the result is negative. Dr. Fenwick, in two of his cases in which were cavities, failed to find the fibre in a first examination, but succeeded in a second.

My experience altogether, including unrecorded cases, can not be said to be large, yet it has been such as would of itself alone impress upon my mind the conviction that this is the most distinctive and important sign of phthisis which we possess; that when the pulmonary elastic tissue is found we can be positive that this grave disease exists, and that when it is not found after diligent search, there is good evidence that destruction of the lung has not commenced, or that a milder malady is in progress.

CONCLUSIONS.

In relation to the whole subject, we consider that the following conclusions are warranted:

1st. The yellow elastic tissue in sputum, as seen under the microscope, is a characteristic, well-defined structure.

2d. Its detection in sputum containing it can be easy and certain.

3d. When found, it positively indicates disintegration of the pulmonary tissues.

4th. Phthisis is *the* disease in which such disintegration takes place, though it also occurs, to a small extent, in certain comparatively rare conditions of non-tubercular ulceration.

5th. The tissue has been found so uniformly in the stage

of elimination of phthisis, when competent search has been instituted, as to warrant the belief that it is present, and may be demonstrated in all the cases.

6th. That as a sign of phthisis it may frequently have a very early application, and in some cases it even precedes all others.

7th. In phthisis alone can we reasonably expect to find this structure in the sputum, the chances of finding it in other conditions being so remote and uncertain as to practically exclude them from consideration.

8th. The demonstrated absence of the fibre from the sputa of suspected cases is of great importance as indicating the absence of phthisis, or, at least, of destructive action.

9th. And, therefore, *the discovery of the yellow elastic tissue of the pulmonary textures in the sputum is a pathognomonic sign of phthisis.*

HERNIA CEREBRI.

BY P. S. CONNER, M. D., CINCINNATI, OHIO.

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Nearly half a century ago Baron Larrey declared that "a large hernia cerebri is one of the most serious accidents accompanying wounds of the head, and it is seldom that individuals so affected recover." Why this is so is a question that has much engaged professional attention, its consideration of course involving that of the associated question of the nature of the protrusion. When and under what circumstances is it developed? There must be a preliminary loss of substance of the cranium. In the vast majority of cases this loss of substance is the result of fracture or the application of the trephine, but that it is not necessarily so is proved by such cases as Cæsar Hawkins' and Pearson's, in which there was loss by progressive thinning in the one, and extensive necrosis in the other, both patients being syphilitic. The loss of any extensive portion of the cranial vault, even to seven by five inches, as in the case reported by Kinkead of Ireland, (in the Dub. Quar. Jour., Feb., '69) is by no means necessarily followed by hernial protrusion;

indeed, such a hernia need not be so much expected under such circumstances as when the opening is smaller.

Reported cases have proved that Mr. Guthrie was not so far away from the truth as has been by some supposed, in saying that these "protrusions rarely take place when a considerable portion of the skull has been lost or removed." Generally the separation of these large pieces of the bony covering of the brain is a slow process, and the result of necrosis, under which circumstances hernia cerebri is not likely to occur, be the opening large or small. Again, not only must the bony wall be defective, but generally the dura mater has been lacerated at the time of the injury or operation; yet the integrity of this membrane under such circumstances does not necessarily forbid the development of the protrusion, for in consequence of pressure from below the membrane may be pushed outwards and become gangrenous, or as in the famous case reported in the Edinburg Medical Essays, torn by the violent impulse of the cerebral mass against it, strengthened though it was by cicatricial tissue of seven months' standing.

Age seems to have some influence in the production of the hernia; certainly a decidedly greater number of cases occur in patients under the age of puberty than is proportionate to the relative frequency of lesions of the head before and after that period. Facts, however, do not warrant so sweeping an assertion as that of John Bell, who declared that "whenever it is necessary to make large openings in the cranium of boys, protrusions of the brain and death ensue." It is very doubtful if *sex* has any influence upon the lesion in question. It is true that the greater number of cases are

in males, but the same is true also of the relative frequency of the injuries and operations which are likely to be followed by the hernia.

At what time in the progress of the case does the protrusion occur? It has been said that in some cases the hernia manifested itself immediately after the receipt of the injury. Using the term hernia in its usual sense, (to-wit, the abnormal protrusion of a viscus, or part thereof, from the cavity in which it is normally contained,) a hernia of the brain may certainly occur at such a time; but this differs widely from what is technically known as hernia, or fungus cerebri. The last may appear as early as the third day, or as late as in the fourth month, but in the majority of cases it shows itself in the latter part of the first, or during the second week.

Its appearance and development may or may not be attended with symptoms of cerebral disturbance. Very generally the characteristic phenomena of inflammation of the brain substance, or the meninges, or both, appear sooner or later, and death is preceded by coma of longer or shorter duration. In one of the fatal cases under my care it was not until the twenty-first day that headache became a prominent symptom, and not until the twenty-third day, sixteen hours before death, that convulsions occurred, followed by coma.

What is the nature of this protrusion, slowly or rapidly rising up through an abnormal cranial opening; pulsating synchronously with the heart; in some cases spontaneously subsiding, in others falling back after sloughing or removals of protruding portions; in yet others, growing, mushroom

like, all the faster the more it is meddled with; always, even when very small, a source of much anxiety, and throwing grave doubts over the prognosis; in many cases *the* complication of fractures of the skull that leads the surgeon to say to himself, if not to others, "This case will certainly prove fatal."

In the various writings on the subject, there have been described as cases of hernia cerebri, luxuriant granulations from the unbroken dura mater, blood clots, granulations arising from the injured brain substance, and protrusions of cerebral matter more or less altered from the state of health. We may leave out of consideration exuberant granulations arising from the edges of the wound and the dura mater at its base, for these, though not uncommon, are of no special severity nor danger, and should not be regarded nor described as herniæ cerebri. Blood-clot tumors, again, need not detain us. We may find such very early, when they are the results of primary hæmorrhage, or later, when the blood is poured out from small vessels opened by the inflammatory processes going on in the part. It is very questionable if such clots can become organized, and any enlargement of these clot-tumors must, if real, be in consequence of renewed bleeding, or be apparent only, the increase of protrusion being due to pressure from below. The two remaining forms of the protrusion may be considered together. By some it has been contended that there is not in any case a true pushing out of the brain substance, but few as are the records of careful microscopic examinations of portions of removed herniæ, yet there are among these reports of the finding of unmistakable evidences of the cer-

ebral nature of the tumors. Again, if no brain substance is present, how are we to understand such a case as that related by Spring, where after successive growths and removals running through a period of eleven years, autopsy showed a complete absence of the left hemisphere. For a long time the opinion was held that the tumor was the result of the increased blood supply of the part, the overfilled portion of the brain pushing out where it met with least resistance, and by such pushing out, in many cases relieving the individual affected from the evils that would otherwise have arisen from abnormal pressure. Again, it has been held (as by Sedillot,) that the protrusion is due to pressure from within, from intraventricular dropsy, thus associating the disease under consideration with congenital encephalocele. In some cases, at least, this pressure is undoubtedly the cause, for post mortem examinations have shown a distended ventricle with softened walls, and before death, for many days sometimes, there is a continual flow from the hernia of a thin fluid in considerable amount, as I have myself observed in one case.*

As to how this ventricular dropsy takes place, we are of the opinion that they are correct who maintain its dependence upon, most generally, inflammation of the pia mater. Any traumatic inflammation of this membrane spreads rapidly from the place of injury over the whole side of the head, and through the connection of the basilar pia mater with the choroid plexus, there is little difficulty in understanding how secondary intraventricular inflammation and

* Lowe attempted to explain these watery discharges by declaring that the fluid was the natural secretion of brain granulations, as pus is of granulations in other parts.

effusion may occur. In some cases, doubtless, an inflammation of the lining membrane of the lateral ventricle and of the choroid plexus is developed by contiguity from the local inflammation of the injured portion of the brain, and this inflammation thus excited will be followed by intraventricular effusion. The true nature of the hernia is, I believe, expressed by Wilks, who says, "After fracture of the skull and injury or sloughing of the dura mater, an inflammatory exudation takes place, and this mixed with the softened cerebral substance, protrudes from the surface; if cut off, it is found to be composed of brain and inflammatory products." That such inflammation should be developed is most natural. The cerebral substance has been more or less contused and lacerated at the time of the injury, perhaps of the operation. The parts, either directly or covered by the meninges, are exposed to the air, and thus excited to inflame, and in not a few cases spiculæ of bone are driven deep down into the brain, and escape detection and removal. Are not these, one or all, sufficient to develop acute encephalitis and meningitis, which latter, if not primary, "almost constantly coincides with superficial inflammation of the convolutions"?

What are the pathological changes that take place in the course of inflammation of the cerebral substance? Says M. Laugier, the author of the article on Encephalitis in the thirteenth volume of the Nouveau Dictionnaire:

"Thanks to Hayem's researches, it is now known that the inflammatory process presents the same characters in the nervous as in other tissues. As in all vascular parts, proliferation of cellular elements, hyperæmia, and the formation of an exudate, constitute the essential elements. * * *

It may terminate in hyperplasia, in suppuration, probably also in resolution, perhaps in gangrene." "There is," says the same author, "œdema and congestion in parts around the inflammation center, and serous effusion into the ventricles." Jaccoud says, "Vascular exosmosis follows the initial fluxion, and a serous or sero-fibrinous exudation is poured out into the tissue, which separates its elements and produces the rapid, early softening which characterizes encephalitis. Most ordinarily the exudation presents itself in the form of an albuminous mass, finely granular, diffused between the nerve elements, and mingled with small flakes of coagulated fibrine."

Numerous post mortem examinations in cases of hernia cerebri have revealed just such a condition of the protrusion and parts around as would be produced by an inflammation presenting the characteristics above given. I have myself found the posterior lobe of the right hemisphere extensively softened, even diffluent, so much so that the posterior cornu of the lateral ventricle could not be traced; the cortical substance of the middle lobe of a dark color, shading off through an olive-green to the normal color seen in the anterior lobe. All the ventricles had been much distended, and their walls were softened. But slight evidences were present of meningeal inflammation. In a number of cases, a number too great to admit of the theory of accidental association, cerebral abscesses have been found to exist below the hernial protrusions. Microscopic examinations of specimens from cases of acute encephalitis, according to Jaccoud, show "with the exudate the following elements: red corpuscles, leucocytes granular or not, debris of fibres or nerve

cells, masses of granulations, free nuclei, finally fatty granules coming either from the nerve elements themselves or the cells of the neuroglia, which very probably are first attacked by inflammatory hypernutrition." Similar examinations of removed portions of hernial tumors have shown with portions of tubules and cells, broken-down nerve fibres and cells, free nuclei, blood corpuscles and granular matter.

The argument in favor of the inflammatory origin of hernia cerebri is further strengthened by the fact already stated that the protrusions are most common in early life, the period in which acute inflammations of the brain and its coverings are most frequent and run highest; and yet further, by the fact of their comparatively seldom occurrence in cases of necrosis of the cranial bones, cases in which chronic inflammation has been long present, and in which acute encephalitis or meningitis is very rarely developed.

If the cerebral and meningeal inflammation is the cause of hernia cerebri, and if it is not the protrusion and loss of brain substance that kills, but this causative inflammation, the indications of treatment are plain, viz.: to remove all irritating causes as far as possible, and moderate the inflammation by appropriate general treatment. All cauterizing, excising, ligating, violently compressing the protrusion, must do harm. Maintaining cleanliness and slight pressure upon the tumor, and, so far as practicable, excluding the air, are all the local measures of treatment that it seems to me should be adopted. I have myself applied Nitrate of Silver and Acetic Acid; have made firm compression by adhesive straps and lead plates; have used the knife, scissors, and the ligature; but shall hereafter hesitate a long while before

I repeat such treatment. If the inflammation does not run so high as to bring about a fatal result, it will after a time subside, and with its decrease will come a spontaneous reduction of the hernia.

REPORT

ON

MEDICAL CHEMISTRY.

BY J. B. HOUGH, M. D.,

Professor in Physics and Chemistry in the Miami Valley Institute.

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"Since we can become conscious of a phenomenon only by some change wrought in us, every phenomenon necessarily implies re-distribution of force—change in the arrangements of matter and motions."
—HERBERT SPENCER, "*Classification of Sciences.*"

At a meeting of the Ohio State Medical Society, held in the city of Columbus, June 8th, 9th and 10th, 1869, the following action was taken:

"*Resolved,* That a committee of —— be appointed for the purpose of reporting upon the propriety of recognizing *Medical Chemistry* as an essential element of a medical education."

The committee to whom was referred the above resolution beg leave to report as follows:

A short time previous to the meeting referred to, the writer had called attention,* in an article which was copied

* Cincinnati Lancet and Observer, August, 1868.

into leading Eastern journals, to the importance of reform in this direction. As the article was but a short paragraph, the liberty is taken of embodying the same in this report.

"While every medical school recognizes the importance of, and provides the apparatus and re-agents necessary for the demonstration of the facts and principles of Elementary Chemistry, very few of our institutions make any provision enabling or requiring our students to become *practically* educated even in the merest elements of the science; and still less in those departments most essentially related to the science of Medicine and Surgery. Very few schools recognize such a department as *Medical Chemistry,* either theoretical or practical, and yet no department will yield a larger dividend to either the college or its alumni. So thoroughly convinced of this fact are the schools and students that have taken a pioneer step in this direction, that they would as soon, nay, rather dispense with almost any other chair. Certain preparatory educational qualifications are required for admission into all our medical colleges, not because they are considered a *part* of a medical education, but because they are an indispensable *means* to a certain *end.* Would it not be every whit as rational for us to establish in every medical college a Professor of Languages, and then stop there, requiring no oral or written drills, examinations or theses, as to have a Professor of *Elementary Chemistry,* and go no further than this, requiring of our graduates nothing more nor less than the same identical chemical education that we would recommend to our dyers, distillers and manufacturers? If the *elementary* or the *applied* science must, one or the other, be omitted in a medical collegiate course,

had it not better be the former, letting it come in as a preparatory qualification, so that the time of the course can be devoted to its *practical application* in medicine? But there is no need of dispensing with *either*. A certain moderate proficiency in *practical* chemistry, both *general* and *medical*, can and should be one of the conditions of graduation. It is not incompatible with the circumstances of any school or student otherwise successful. While medical colleges are generally moving in the way of reform, it is ardently hoped that this subject among others will not be overlooked. Let every school provide itself with the means of putting this advantage into practical operation, and the investment will prove highly remunerative to all concerned. The physician who has even a moderate proficiency in this line, is in possession of advantages second to no other item of qualifications. To him formulæ and processes are matters of convenience, not of necessity. He is independent, if he chooses to be so, of careless, incompetent, or dishonest apothecaries. Phenomena that reveal nothing to others, or give rise to nothing but trouble or perplexity, may be to him the finger-post that shall point him not only to the means of saving lives that might otherwise be lost, but also to that goal of every noble-minded physician's ambition, a high degree of success and well-merited eminence. Practical pharmacists well know that their *reliable* preparations find their way into the hands of those who know enough of chemical tests to protect their own interests. A *very large* proportion of the drugs prescribed and dispensed are only mere compromises of what they should be, sufficient only to gratify the wishes, but not to supply the wants of those who

use them. Whenever those who use or prescribe medicines under their own personal responsibility are *generally* sufficiently posted in practical tests to protect themselves from imposition, then, and not until then, will reliable drugs be the rule instead of the exception. The amount of actual chemical knowledge obtained and retained by the mass of medical students who "graduate" without any course of practical drill, amounts necessarily to just about nothing at all. Many retain a vague remembrance of elements, equivalents, and even some of the general laws of affinity; but what is their knowledge of them more than a mass of verbiage? Though they may have been students of the highest natural capacity, and may have attended the finest and ablest of lectures, still they find it about like learning to swim without going near the water. No wonder the value of chemical science is underrated even by the medical profession. It is one of those things that can be appreciated only as it is understood." *

There seems to be, however, a general willingness to admit that chemical processes are competent to grapple with abstruse and delicate problems, and to originate wonderful and beautiful experiments; but when it is proposed to direct by its aid the every-day business of a medical practice, most physicians are exceedingly skeptical. All are willing to admit the ability of the analyst to detect the thousandth part of a fatal dose of almost any poison; none dispute that fermentation is impossible in presence of the merest trace of certain chemical agents; all agree that heat or acids will

* It is but just to state that since the date of this paragraph, some instances of reform have occurred; but there is much yet to be done.

coagulate albumen; that tannin precipitates gelatin; that pepsin dissolves vegetable and animal tissues; that air or oxygen hastens, while caustic alkalies retard or prevent the coagulation of blood; and still they doubt the value of chemical evidence in the investigation of physiological and pathological processes!

Every process in nature, terrestrial and celestial, vital as well as non-vital, physiological, pathological, or therapeutic, is merely a change in the arrangement of matter and force. It has been customary to classify all motions as mechanical or chemical; the terms molar and molecular have also been used; and though it was formerly thought that the line of demarkation was distinct and easily drawn, it is now known that the phenomena and laws of one class of motions are in the main applicable to the other, and that a middle ground exists for which the terms Molecular Physics, Molecular Mechanics, Chemical Physics, etc., have been variously proposed. In fact, the different departments of physical science are so intimately related that the distinctive names applied to them are often conveniences, rather than necessary terms representing natural divisions; and when we use the term *Medical Chemistry*, we wish to be understood as including under that term all that range of topics necessary to form a connected and complete system. It may be claimed by some that there is little or no *demand* for any such complete system; but whatever truth there may be in such claim, it can not be thought that we have no need of it. Had steamboats, railroads and telegraphs been withheld until a demand called them into existence, we had been without them t-day. Utility creates its own demand.

An immense mass of useful knowledge relating mutually to Physics, Chemistry, and Medicine is now "lying about loose." Why not embody it under some individual form? No matter, perhaps, whether we call it Medical Philosophy or Medical Chemistry. The inquiry comes from within and without the profession, "Have we a Medical Philosophy?" Assuredly; if we have not, it is time we had! *All truths harmonize.* Every true science *necessarily* harmonizes with every other true science. If any contradiction occurs between any two, one or the other must necessarily be false; for one truth can not contradict another truth. Now, there are certain immense strides that have been made in the physical sciences within the last quarter of a century that have scarcely begun to react upon the medical profession. Foremost among these is one that enters as a common factor in all the phenomena of nature—

THE RESISTANCE OF FORCE.

This cardinal truth, known also as "The interaction of natural forces," "conservation of energy," "correlation of forces," etc., is admitted on all sides to have an application as wide as the range of human thought. A truth "deeper than demonstration—deeper even than definite cognition—deep as the very nature of mind." "Its authority transcends all others whatever; for not only is it given in the constitution of our own consciousness, but it is impossible to imagine a consciousness so constituted as not to give it." "The sole truth which transcends experience by underlying it." *

* Herbert Spencer.

It would be out of place in this paper to elucidate the great doctrine referred to, but we may safely say that upon this field is to be fought the final battle of Truth against Error, and the side on which the ranks of Æsculapius stand or fall the thickest, will depend the course the profession takes during the next few years. The *spirit* of progress is rife enough, but it is too much disposed to run in speculative channels. It is the spirit that nurtures "pathies" rather than pathology. It is too prone to value fictions rather than facts. While the physical sciences generally are taking a bold and rapid march onward in this line of truth, shall medical science loiter by the wayside, leaving its deserters here and there to swell the ranks of charlatans and quacks, those ghouls that feed on putrefying ignorance? We believe that the greatest influence we can ever bring to bear toward wiping out the polluting stain of quackery within and without the profession, is a thorough revision of medical teaching and text-books, bringing both fully abreast of the times, and especially in the line to which our subject refers. The tenacity with which many influential writers and teachers cling to old books and obsolete ideas is astonishing. It is high time that those in high places should make a clean sweep of all the rubbish, and place Medicine in the front rank of those sciences whose *alma mater* she has been. Assuredly if we do not do it quackery, with its pseudo-science, will gull the public into believing that it is doing what we are neglecting. Let it not be understood that we are making a sweeping complaint against medical teaching. *Most of it is admirable.* Nor that we disparage the mass of truth, the product of centuries of labor and observation.

Our objections are taken to the faults of omission, most of which would be covered by a comprehensive system of Medical Chemistry. The student is taught that a given bone has a given articulation, and is moved in a given direction by a given set of muscles; but is he required to learn that muscular contraction is the correlated expression of chemical change? Perhaps he is befogged by a superstitious faith in the dogma of a "vital force." If so, he must submit to be led by an unseen fatality which he imagines to be independent of matter and physical laws. If the chemist has shown that there is no such thing as "vital force," or at least no reasonable evidence of its existence, why continue to nourish it as a pet fiction of the brain? If it have no foundation in physical nature, the ravings of delirium, which also are creatures of the brain, have an equal claim on our credulity. But has the chemist done all this? Has he not, by directing the known physical forces, already built up hundreds of those organic compounds that were, and still are by many, taught to be the special products of a "vital force?" "Of the three great classes of organic compounds, the oleaginous, the saccharine and the albuminous, the first is completely under his power, and the second partially so." How long it will be before the other half is accomplished we know not, but dare not venture the dictum that the same intellects that sought out this much of the hidden ways of nature are powerless to go further. Instead of concealing our ignorance under a very doubtful hypothesis by explaining the relations of diseases and remedies to the nervous system and the fictitious energy invented for that purpose, let us study the relations of food

and medicine to the animal forces, and the relations of these to other known varieties of energy. But we must be cautious about believing every dictum, whether in harmony with experience or not. The *great* thinkers sometimes err. The same man that taught that nitrogenous food was the source of muscular power, and non-nitrogenous food the fuel that generates animal heat, said also, "Show me the man who never errs, and I will show you the man who accomplishes nothing." When Fick and his associate questioned nature on this point, she answered that the work done is *three times as much* as the oxidation of the nitrogenous tissues could possibly supply, and that muscular force as well as heat is mainly dependent upon the carbon consumed as fuel; so that vegetable and animal tissues act only as machines for converting the forces of inorganic into those of organic nature. Progress in every department of science depends upon the accumulation of *facts;* in the storing up of these we are building up experience, but it is only by the elaboration of these into *truths* that we establish those general principles which alone constitute the basis of all true science. It is no misfortune, then, that Medicine is, to a great extent, empirical. But we must not forget that this element does not yet constitute true science. It is a mass of raw material waiting to be wrought into science. Science is the *relation* not the *summation* of experience.

It is not thought necessary to give here even a brief outline of what Medical Chemistry should include, or what it may be expected to accomplish. Its claims are set up on general principles. However, there is one line of research that might, for the present at least, be profitably included.

Microscopy in its application to medicine is largely dependent upon chemical tests, for which and other reasons, a practical knowledge of the construction and use of the microscope might justly be communicated through this channel. Here and there a school makes some provision for microscopical manipulation, and a very few for some of the simpler medico-chemical tests. Why not unite the two, and make both more thorough and efficient? There are few chemists who are not practical microscopists as well. Some such reform must and will be brought about. The public, even the uneducated public, demands it. The strongest hold that charlatans and quacks can secure, by their free and universal system of advertising, is the credit they get of being the progressive and scientific prodigies they pretend to be. A neighbor of mine was seduced by one of those incendiary circulars into visiting one of the "great" city celebrities, the "celebrated Dr. So-and-so." He found the waiting-room "crowded with scores of patients waiting to be made whole!" "And," said he, "when I was ushered alone into the august presence of his doctorship, I was perfectly convinced that I had found a great man; for there over a furnace was a huge boiler, with pipes coming out of both sides, and both ends, and crossing each other, and doubling and twisting about over and under, and in and out, and up and down, with stop-cocks and jim-cranks, and elevators and perambulators running into refrigerators and duplickets, and making the all-firedest sizzlin' and fizzlin' you ever heard of, and the infernal machine distilled thirty-five dollars out of me before I could take time to think." And thus it is. Science is in demand, and if we don't furnish

a genuine article the counterfeit will be supplied *at our expense.*

We feel like begging pardon for calling attention to a matter so obvious that its bare mention is almost a reproach. Some, however, may insist that we might well be satisfied with what is being done in this direction, but *such opinions do us no credit.*

In conclusion, then, two modifications in the course of medical education are insisted upon:

First. Let Elementary Chemistry be required as a preparatory or undergraduate qualification; and,

Second. Make a respectable knowledge of Practical Chemistry, both General and Medical, one of the conditions of graduation.

REPORT ON OTOLOGY.

BY W. W. SEELY, M. D., CINCINNATI, O.

REPORT ON OTOLOGY.

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GENTLEMEN: — I propose only to occupy so much of your time as will enable me to call your attention to some points, and make some suggestions in Otology that I have deemed worthy of consideration, presuming on a knowledge more or less extensive of the subject.

I trust I shall be able to add some little to your interest in this department that lays so much claim to consideration, and whose practical outcomings are so important and are so earnestly demanded. A constantly increasing experience convinces me that in no department of medicine are more brilliant therapeutical results to be looked for. The accessions to the ranks of earnest workers are greatly on the increase, the great lacuna occupied by empirics has been filled, and to-day the science and art of Otology stands on a foundation worthy of all honor.

It would be a difficult problem to estimate the value of our hearing power. Its true worth is only to be sought in the longings of those who have lost it.

I am especially desirous of fixing your attention on ear

troubles in children; for it is in early age that the seeds of so much future trouble are sown.

As yet the popular and professional fallacy with regard to ear-ache and deafness in children, is by no means done away with.

The subject reveals itself in all its magnitude when we reflect that the majority of children suffer from ear-ache, and its importance is shown when we know that almost the sole cause is an *inflammation*, and that at this age the drum cavity is exceedingly small, so that the most serious results may follow. A large per cent. of patients will tell you that they suffered from ear-ache in childhood.

Ear-aches and otorrheas may be "outgrown;" curing them saves time and does away with the risks. In many of the diseases of childhood we may have complications on the part of the ears, frequently so serious as not alone to cause symptoms of brain trouble, but actual meningitis. Valuable statistics could soon be collected if physicians would record in their note-books the condition of the ears, along with the symptoms and time at which the complications arose. The results in my practice show a very great increase in the percentage of cures, and an enormous increase in the improvements, in the cases that present. As regards the means for perfecting the diagnosis, I would call your attention to the significance of the sound-conducting power of the cranial bones. It will be readily understood that this conducting power alters with increasing age; hence, in old persons little use can be made of it.

We no longer regard an examination complete without the use of the tuning-fork and the galvanic current.

VALUE OF THE TUNING-FORK.

In *The Clinic* of May 25, I gave a short abstract of the striking experiments of Dr. Emil Berthold to render the conducting power of the cranial bones visible by showing the movements excited in the membrana tympani. Most of you are aware that if a watch or tuning-fork is placed upon the head or the teeth, stopping the ears causes it to be heard better; stopping the two ears alternately, increases the sound in the closed ear.

The great difficulty that has been experienced is in locating the affection. It was easy formerly to solve the question by calling it "nervous," but such a diagnosis in the majority of cases now would be not a little hazardous for any one who valued his reputation. The idea that because the watch is not heard when in contact with the cranial bones or between the teeth, the nerve or its expansion is diseased, has been shown to be fallacious, because the bones do not alone conduct the sound. We must take into consideration the resonance of the other parts.

If we assume, as Mach claims, (see p. 249 Roosa's Translation of Troltsch,) that "The tones are increased in strength because the sonorous waves are prevented from being softened or dissipated by passing out of the ear," then anything that prevents the passage out of the ear, cerumen, closing of the external meatus by inflammation, thickening of the membrana tympani, collections in the middle ear, etc., provided the nerve is normal, will cause the sounds through the cranial bones to be heard louder in the affected ear. If, however, the fork is not heard better or as well in the bad

ear, then we are more or less justified in assuming that the nervous apparatus is affected, and it then remains for us to decide whether it is a primary or secondary affection of the labyrinth, as we have every reason for believing that the auditory nerve may lose more or less of its sensibility by continued deprivation of its normal stimulus sound. To make my meaning a little clearer, if the patient does not hear the watch or fork when placed close to the ear, but distinctly when placed on the bones, we are justified in concluding that there is some interference to the passage of the sound through the external canal, the membrani tympani, or the cavity of the drum. If, on the contrary, the fork is heard very indistinctly or not at all on the vertex, we can infer either extraordinary pressure on the two fenestræ, or some diminution of the sensibility of the nerve.

One great difficulty in the way of all such tests is that patients fail to give correct expression of their experience, and it is then advisable to have additional means for verification which, to a great extent, obviates the defects. The double otoscope enables us to judge for ourselves. In this apparatus a tube is placed in either ear of the patient and the third arm in our own, when the sound will be heard loudest by the examiner (closing alternately the tubes in the patient's ears) from the patient's better ear.

THE CONSTANT CURRENT.

I presume there is little doubt remaining in the minds of the majority of aurists that the acoustic nerve will respond to the constant current.

My experience has left no room for doubt in my own mind.

It is probably well known that the galvanic current is the only one that can exercise a direct influence upon the nerves of special sense, and the great nervous centers.

It is likewise known, as Pfluger has shown, that the nerve is excited only by the appearance of the catalectrotonic state, and by the disappearance of the analectrotonic, and that it is the galvanic current that produces the molecular change in the nerve, as declared by Du Bois Raymond, electrotonus.

Brenner gave certain formulæ which he claimed could always be produced by the current upon the auditory nerve. I have been in the habit of trying the current upon the cases of ear trouble that have presented at my private rooms. that I regarded as at all suitable. I will state the formulæ as given by Brenner, for convenience of comparison while giving my results. With the cathode upon the ear and the anode in the hand, on closing the current there is an acoustic sensation. During the continuance of the closing, the sound diminishes and finally disappears.

At the cathodic opening of the circuit no acoustic sensation is heard. At the anodic closing of the circuit when the ear is under the influence of the anode, no acoustic sensation is felt.

During the anodic duration no acoustic sensation at the anodic opening, the same sound being heard as at the cathodic closing. In order to use the current to the best advantage, the instrument must be as perfect as possible. I make use of thirty elements of Siemens and Halske; and the accessory apparatus as devised by Brenner, and made by Kruger and Hirschman, of Berlin.

It is well known that tinnitus aurium is one of the most annoying circumstances in connection with some ear troubles, and patients will frequently say if they could only be relieved of the noises they would not mind the deafness.

I propose to narrate a few cases, not only because I feel that they are important as illustrations of the reactions which the current is capable of producing, but because they also serve to show that galvanism may be made of service in a diagnostic and therapeutic point of view, that some percentage of patients can at least be relieved from the worrying noises by the current.

CASE 1. An intelligent patient of thirty-four, who has been growing hard of hearing for fifteen or twenty years, has been under my care, off and on, for several months for chronic otitis media.

The membranes were thickened, opaque, and somewhat concave. Light spots nil.

No deposits in the membranes. There was at first almost complete atresia of the Eustachian tubes, only a suspicion of air passing into the middle ear by inflation through the catheter.

I, on several occasions, mechanically dilated the tubes by means of the cat-gut, (size E fiddle string.)

Six weeks ago the patient had, as the result of a cold, a sub-acute attack of inflammation of the middle ears.

Under inflations once or twice a week he improved somewhat, and his hearing is considerably better than when I first saw him. I found a very great difference between the hearing of the fork when placed upon the vertex and when placed in the ear.

Also a very great difference between the length of time the patient could hear the vibrations through the bones and that through my own, fully half a minute's difference. The patient could hear the fork for ¼ minute when the handle was placed in the meatus, while I could continue to hear it for 1¼ or 1½ minutes.

I found that as the hearing improved, which it did rapidly after his sub-acute attack, I could see a corresponding change in the length of time the fork was heard in the meatus. I found also that as the hearing improved the fork was not heard quite so long upon the vertex, (the time on the patient's vertex and in his ear, on my vertex and in my ear, was about reversed.) The constant current confirmed my diagnosis of the great hyperæsthesia of the acoustics, for by the most careful and almost indefinitely repeated trials I found that three elements would produce, on cathodic closing, a distinct singing sound which was immediately quieted by changing the current in the metallic part.

I interpolated the rheostat, though no resistances were necessary.

The patient only had very slight, indefinite sounds in the ears when the use of the current began, and only has them occasionally now, when the hearing is not quite so good.

CASE 2. Mr. L., æt. 28, affected with sclerosis of the tympanic lining, forming one of those hopeless cases on which, so far as our present knowledge extends, remedies have but doubtful effect.

Slight noises in one ear. Ten elements with cathodic closing produced a singing. At the cathodic opening a similar singing sprang up in the opposite ear, which contin-

ued during the anodic closing, and gradually disappeared on the anodic opening.

Here, it will be seen, we had a case of tinnitus with the so-called paradox formula in the opposite ear.

Dividing the electrode, so that its two branches could be placed in either ear, and slightly increasing the strength of the currents, had the effect of stopping the noises, without the exciting of one in the opposite ear.

CASE 3. This was a case of chronic otitis media in which I found reversal of the formula. Instead of the noises being quieted by anodic treatment, they required the cathodic.

I presume I will be asked about further therapeutic results. I have only stated what I have seen and am positive of.

As yet I have had but a limited opportunity to test the treatment by the current alone. I have eliminated a few cases on which I am confining myself to the use of the battery. The large majority of cases of deafness in grown persons comes from catarrh of the tympanic cavity, and as we already by our present therapeutic means have such striking results, one is unwilling to resign a case till a thorough trial. Thus it will readily be seen that an extensive experience at all intelligent, is not to be gained in a few months.

ACUTE OTITIS MEDIA.

Arresting acute otitis media, or acute inflammation of the middle ear, and quieting the pain, have always been points of extreme moment. The pain is extraordinarily severe in many cases, and the disease, if not properly treated, may

extend to the mastoid cells, thus causing not only a wearying abscess in the mastoid process, but even inflammation of the brain and death.

Catheterization of the Eustachian tube, repeatedly filling the ear with hot water, leeches, have been the reliance, and while I would especially call your attention to their wonderful effects, yet the recommendation of Professor Weber, of Berlin, for such cases, I can endorse, so far as my trials have gone, fully, viz., the internal administration of the oil of turpentine. I think that a few cases of acute otitis externa not purely such, but with more or less extension to the middle ear, where I have had striking results, justify me in recommending its trial in those painful inflammations with the formation of abscesses. The dose is a half teaspoonful morning and noon, and a teaspoonful at night.

By the measures recommended, I believe that a large number of mastoid complications will be averted.

TREATMENT OF OTORRHEA.

As regards the treatment of otorrhea, both in children and grown persons, the chief desideratum is the thorough cleansing of the ear.

Syringing is by no means always sufficient, in fact, many times seems to be *absolutely injurious.* The secretion can be blown out by inflation, either by the catheter or by Politzer's method, or washed through the Eustachian tube into the throat, by filling the ear with water and making pressure on the tragus, or washed the other way by passing the water through the meatus, inflating at the same time that the patient swallows, while the head is inclined at the same time

far to the diseased side. The use of the probe and cotton will be found of great service also, especially when the parts need to be dry for the application of remedies, as in polypus and polyposed conditions of the membrana tympani.

While all the astringents are used for otorrhea, I would especially recommend zinc, both the sulphate and acetate, and nitrate of silver. My advice is always to begin with a weak solution, (½ to 8 grs. ad. ʒi. twice or three times daily) not only because it is often sufficient, but because a stronger solution may cause pain, and thus terrify the patient, and prevent further applications, and also actually do harm instead of good, if not preceded by a weak solution to accustom the parts to the contact. I need not say that frequently it will be necessary to change from one astringent to another. Everybody knows that in treating iritis the effort is to prevent synechiæ posterior, and if already formed to tear them loose, otherwise the eye can not be regarded in a healthy condition.

We have in otorrhea a larger or smaller perforation of the membrana tympani, the purulent fluid coming from the middle ear. Certainly neither parent or doctor in his right mind would allow such a stinking discharge to run on from any other part of the body, and in a purely sanitary point of view its neglect is beyond comprehension.

Again, how can it be expected that the ear will become sound until the perforation or perforations (as they may be multiple) have healed, and of course the longer the discharge continues, the more difficult is it for this to occur. Every one should then put before him as the goal to be reached in

the treatment of otorrheas in children, *the healing of the perforation.*

So great importance is attached to the soundness of the drum-head that both many patients and not a few physicians are unwilling to admit that there is a perforation.

Again, in cases of very great deafness with discharge, the reigning idea seems to be that the membrana tympani is *totally destroyed.*

While the membrana tympani is of very great value in an acoustic point of view, it also plays an all-important role in protecting parts of still more value, the soundness of the two fenestral membranes being of still greater importance. Bear these points in mind and all the mystery of hearing with a perforated membrane, of very bad hearing with a very extensive loss of the membrane, capable of being made very good, will be solved.

If a perforation remains unhealed, the ear is left in an *unhealthy* condition, and you can never tell when the disease may reappear. Then remember the membrana tympani in its tutaminal function, its *protecting* role, and endeavor to make it perfect.

POLYPI.

The rule for the treatment of polypi is avulsion with the snare, undoubtedly the plan when it is possible to do it, and the rule will hold in about one-half of the cases.

I wish particularly to call your attention to the treatment of the other, the more important half, at the same time to explain why simple avulsion does not always succeed.

When the mass of the polypus is torn away, the pedicle may or may not be destroyed; if the latter is the case, you

may expect a return, without energetic treatment of the remaining base. Many substances have been used for touching this base, such as nitrate of silver, chloride of zinc or iron, etc., and undoubtedly success is obtained by their effects. However, I much prefer the chronic acid.

I can see but one drawback to my unhesitatingly recommending it in all cases of polypus of the ear, for it is, in my opinion the most efficacious, that is, the great care necessary in its application. Those who have seen its employment hundreds of times at the Dispensary of the Medical College of Ohio, will testify to its freedom from danger when carefully used. With this remedy, polypi in children no longer offer any embarrassment, since a few applications of the acid suffice to remove very large ones completely.

While polypi are the *result* of purulent otitis, they as *results* may in time become continuing *causes* of the discharge and with their removal the otorrhea is cured. After thoroughly drying the ear, cleansed of all discharge, I apply on the point of a small probe, a minute crystal of the acid, seldom larger than an ordinary pin's head. If the polypus is large, and I find the medicine has only made a small impression, I apply it again the next day, and then wait three or four days, when usually a white mass of charred tissue will drop off. After two applications I wait for this exfoliation. As the mass diminishes, I use more care in the application of the remedy.

Every one knows that a discharge from the ear is only a *symptom*. Where polypi are not present, we may have a very granulated condition of the mucous membrane to deal with. In such cases I have found strong solutions of the

chronic acid to answer a good purpose, but no brilliancy is to be looked for by any plan of treatment.

Before closing my report, I must say a few words about the use, or rather, *abuse* of the Eustachian catheter. I find now that the use of this instrument has become more general, a good many patients to whom the process has not only been painful, but where the results, to say the least, have been doubtful. Some of these patients have presented normal meatus, and whose deafness has been most amenable to treatment.

Certainly the fault was in the operator, and every one should be fully aware that an operation so free from danger and the results of which are so brilliant, may, if bunglingly performed, do harm.

AMPUTATIONS.

BY T. H. KEARNEY, M. D., CINCINNATI, OHIO.

Professor of the Principles of Surgery, etc., Miami Medical College.

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In bringing before the Society a subject so trite and commonplace as that of Amputations, some explanation may be reasonably expected. My object, briefly, is to call attention to certain points of great importance, though I may not be able to add much to the general knowledge; and my excuse lies in the great diversity of views which prevail among surgeons as to the most appropriate methods of operating. For any topic which gives rise to such opposite opinions may be properly regarded as one still open to further discussion.

The essential points in the subject are: 1. The form or plan of operation attended with the least risk to the life of the individual. 2. The form which will give the best resulting stump; and 3. That mode of operation which admits of recovery in the shortest time—the speediest healing of the wound. To the consideration of these three points I propose limiting myself in this paper, except some brief allusion to certain special amputations, in addition.

Under the first heading I shall of necessity be very brief; for the estimation of the risk to life in any given case depends on so many different considerations, that no general rule can be adopted which can be applied as a guide in practice. It may, however, be repeated, that the farther from the trunk any part is removed, the less the risk to life. Therefore, *cæteris paribus*, the operation which attains this object should be regarded as the most favorable. It may also be stated that the less the extent of the operation wound, the less the danger to life incurred. But, as the further consideration of this question is to a greater or less extent involved in the discussion of the other points of the subject, we will proceed to consider the second of them, namely:

The form of amputation resulting in the most satisfactory stump. Strange to say, on the question of the relative merits of a covering for the end of the stump purely of integument, or of one involving a greater or less amount of muscular tissue, surgeons the world over are divided.

Before attempting a comparison, with the view of determining the relative value of the circular and flap methods, it may be well to consider what are the *desiderata* as regards the ultimate characteristics of the stump. These may be stated to be: a complete covering of the face of the stump with healthy integument; a minimum of cicatrix resulting after the healing of the wound; and freedom from adhesion to the end of the bone.

The first of these objects is attained by any of the methods in vogue, as an immediate result; but it is the ultimate condition of the stump which is to be regarded. And as

the maintenance of the covering integument in position is requisite to a satisfactory result, we may consider what method of operationg promises best in this particular. In the ordinary double-flap operation, the muscular tissue in the flaps is bent from the normal direction of its fibres in bringing the free extremities of the flaps into apposition; hence, any amount of contraction in that tissue tends to separate the edges of the skin, and thereby to prevent speedy and close adhesion. Where inflammation, with attendant swelling of the flaps ensues, the gaping of the edges will probably be very great. When, however, the ends of the cut muscles in the face of the stump are covered with integument only, as in the circular method of amputating, this source of difficulty is avoided. There the retracting muscle is accompanied by the integument applied over its cut extremity, with very little tendency to the disturbance of the most delicate adhesions. Consequently, the tendency to gaping of the edges of the skin in this form is limited to what may be due to the natural contractility of that tissue, unless great inflammatory swelling of the limb occurs. Here, we think, we recognize the superiority of the circular over the flap method.

In the second place, as regards the extent of cicatrix remaining after the healing of the operation wound. This result, perhaps, is more distinctly determined by the form of operation selected than any other. For, while the double-flap operation, for instance, gives a resulting cicatrix equal to the full diameter of the limb at the point of amputation, minus the shrinkage or contraction it undergoes only, the cicatrix from a circular operation is diminished by this con-

traction in part, but still more by the folding over and adhesion of the corners of skin at the extremities of the line of union, precisely as the corners of a grocer's paper bag are folded down. Another great advantage which may be recognized in this infolding of the redundant integument, is the increased thickness given to the face of the stump by these resulting bosses; which in fact consist of three thicknesses of the skin at these points, and which leave the much diminished cicatrix depressed considerably below the general level.

The method by skin flaps with a circular division of the soft parts, may here be contrasted with the ordinary circular operation. This plan, much practiced and advocated by the late Professor Syme, amounts to the circular operation with the redundant corners of skin removed. It requires a division of the skin as low as does the circular, and has no single advantage over it that I can conceive of; but on the other hand is far inferior, in the fact that it results in a line of cicatrix equal to the full diameter of the part, as in the case of the ordinary double muscular flaps, and is wanting in the other advantages ascribed to the circular method.

The third desideratum mentioned is freedom from adhesion to the end of the bone. Whether this desirable result may be better obtained by one method than the other may, perhaps, be a question of doubt. But, in parts with two bones, the circular operation offers the advantage of allowing the line of union of the margins to be placed in any direction, thus enabling the operator to throw it in the interspace between the bones, and not across their ends. In certain situations, as low in the leg, this interspace, besides

being very narrow, does not correspond with the center of the limb. To carry out the idea mentioned, in operating here, it would be necessary to incise the skin obliquely, leaving it longer on the side most distant from this space. But it is not pretended that this result can be obtained unless the healing process takes place kindly, and in great part by first intention, perhaps. For, inflammation and protracted suppuration is most apt to lead to retraction—it may be, to the extent of a protrusion of the bone. In the third place, it remains to consider what plan of amputation results in the speediest healing of the wound. This it is difficult to decide positively. But, as according to Ballingall and others, the operation by the circular method at any particular point gives rise to a much less extent of wound than that by the formation of flaps at the same point; and as the immediate union, at least in part, is less apt to be interfered with by muscular contraction or secondary hæmorrhage in the circular amputation, that method would seem to be the one promising the speediest cure.

While claiming so many advantages for the circular method, it is not intended to deny certain others which belong to the flap operation. Among them may be specified celerity in execution and a more shapely stump, with a thicker covering of soft parts over the end of the bone. These advantages, however, are more seeming than real. For, now that amputations are almost invariably performed with the aid of some anæsthetic, the diminution of time occupied in the operation by a few seconds, or even minutes, is of little importance. Rapidity of execution is only desired, then, as a mere matter of display, and therefore is

unworthy of consideration. The more shapely appearance of the stump given by the double-flap operation does not afford any strong argument in favor of that method; as the ultimate and not the immediate character of the stump is what decides the relative value of operative proceedings in this particular. Neither can it be claimed that the much and often extolled "cushion" of muscular tissue which covers the end of the bone in ordinary flap operations is a real advantage. For this cushion is not permanent, but shrinks and wastes in the course of time, as the muscular tissue degenerates; so that the covering of the end of the stump comes at last to consist of little, if anything. more than integument.

But there are other serious objections to the flap. A prominent one is the oblique section of the vessels, which leaves them in a state unfavorable to closure by the retraction of their coats; and hence the necessity for a greater number of ligatures than when they are cut square. For the same reason, secondary hæmorrhage is much more apt to occur after a flap than after a circular operation.

The arguments in favor of the circular mode of amputating may be briefly repeated as follows: A less extent of wound surface; better prospects for immediate union, the wound being less under the influence of muscular contraction; diminished risk of secondary hæmorrhage and irritation from ligatures, through the square division of the vessels. To these may be added, that an amputation at any given point of bone may be accomplished by the circular method with the aid of less of the soft tissues below that point than is necessitated in the formation of flaps; or, in other words,

the level at which the integument is to be divided being determined, the bone may be divided at a lower point in operating by this plan than when the flap method is used.

While advocating, as a rule, the superiority of the circular over the flap method, I am not denying the greater advantages of the latter in certain cases. Thus, where rapidity of execution is essential, as at the hip, the flap method should be preferred. And in cases where, from the condition of the soft parts, the section of the bone might be made at a lower point than practicable by the circular method, the former should be adopted. Again, in a large limb, as high in the thigh, when the dissection of the integument would require to be carried to such an extent that the vitality of that integument would be compromised by such an extensive separation from the underlying tissues, the retention of some of the muscular tissue might be regarded as a less evil than the risk of sloughing. Here a flap amputation might be preferable to one by the other method. In the lower part of the thigh, however, and at all points where the muscles would have to be divided at a considerable distance from their superior attachments, I consider the flap amputation peculiarly inappropriate. For, in such situations, the injurious influence of muscular retraction will be felt in the greatest degree. In this I am advancing an opinion in direct variance with that of Dr. Ashurst, the most recent American writer on surgery, who gives a special preference to amputation by flaps both above and below the knee. But in the absence of his reasons for the instructions he gives on this point, I am unable to offer any further argument.

Before dismissing this part of my subject, I desire to refer,

briefly, to the method of amputating introduced by the late Mr. Teale, of Leeds. This method is by a long and short rectangular flap, as is well known, and is advocated mostly on the ground of the very perfect manner in which the end of the bone is covered and its protrusion rendered impossible. Other surgeons besides Mr. Teale have practiced and extolled this operation; yet I venture the opinion that a more general trial of it will lead to a reversal of the favorable views which have been formed of it. For the extravagant extent of wound surface it entails must condemn it as irrational.

The foregoing observations are intended to apply, especially, to amputations in the continuity of the bones. I propose to devote my remaining remarks to amputations in the contiguity, or disarticulations, chiefly.

The first in order of importance is that at the hip joint. This operation has been modified in various ways, so that some twelve or fifteen different methods are described. But two or three, perhaps, afford all desirable variety. That one which seems to have beeen most frequently practiced is that with an anterior and posterior flap of about equal length, generally described as Beclard's method. A single anterior flap, also, has proved satisfactory, and under certain circumstances may be preferred to the last mentioned. Guthrie favored a modification of the circular method. A further modification of the circular is that now known as Lacauchie's method; and which consists of a high circular operation extended upwards over the great trochanter. This is the same plan, however, adopted in the first hip-joint amputation performed in this country — that of Dr. Brashear in

1806. It is difficult to understand why it should be supposed to possess any advantage over other operations, for it makes a wound of great extent, as, in addition to a circular amputation in the upper part of the thigh, there is superadded that additional wound required to expose the joint and allow of the dissection of the femur from the surrounding tissues. By experiment on the cadaver, I satisfied myself of the greater extent of wound in this method of operating than in that by double flap; and I afterward found an account by Mr. Annandale, in the Edinburg Medical Journal, for April, 1870, of a similar but more perfect demonstration of the fact by himself. For he had casts of the cut surfaces taken, and measured by experts, proving that fairly proportioned double flaps give a smaller wound surface than results by the method last spoken of.

In so fearfully grave an operation as this, of course the chief consideration is that relating to the risk to life. Therefore, the operation which seems to diminish that risk most is the one to be adopted, and without any reference to the character of the stump or cicatrix which is to remain. It having fallen to my lot to perform this operation once, I take this opportunity of offering the advice, based on the experience of that case, to be provided with an aortic tourniquet by all means, for digital compression of the artery at the groin can not be depended on.

Disarticulation at the knee joint is one of the adoptions or revivals of modern surgery. Though looked on with distrust for a long time, it may now be regarded as fully established in the favorable estimation of surgeons. Its present popularity is in great measure due to the advocacy

of it by Velpeau, Syme, Carden, Pollock and Stokes in Europe, and Markoe and Brinton in this country. The operation has been variously modified by the surgeons named, chiefly by the removal of more or less of the condyles and patella. The covering is chiefly by a long skin flap taken from the anterior aspect of the limb; but some amount of posterior flap is absolutely necessary to avoid injurious traction. Considering the extent of skin flap required to cover the broad articular surfaces of the femur at the knee, when these are not removed, great care is required to prevent its being damaged by excessive traction or the incautious use of the knife in its dissection. And to allow as liberal a blood supply as possible, the flap should be cut as wide as can be allowed. Therefore, the incision should commence and terminate considerably posterior to the center of the limb on either side, and need not extend as high as the line of the joint by half or three-quarters of an inch, as the integument may be easily retracted to that extent after the flaps are cut. The removal of the patella in any variety of amputation through the joint inflicts, unavoidably, an amount of injury to the flap that is very apt to result in sloughing. Hence, that bone is now generally left, either whole or after the removal of its posterior or articular surface.

At the ankle, the operation devised by Syme is that which is most frequently performed. The chief difficulty attending its execution is that of the dissection of the heel flap from the os calcis. This difficulty may be increased or diminished according as the incision from malleolus to malleolus, beneath the heel, is made too far forward or inclined more backward. Much will also depend on the natural

configuration of the heel, which varies a good deal in individuals. A deviation from the usual method of performing this operation which I was induced to adopt within the past year, was the retention of the malleoli. It was in the case of a child, fifteen months old, whose foot was crushed by the passage of a railway wheel over it. Considering the greater plasticity or adaptability to change of form of the bones at this tender age, and also the importance of the preservation of the epiphyseal points with reference to future growth, I abstained from any interference with their malleolar extremities. The resulting stump is all that could be desired. Velpeau, indeed, spoke favorably of this course even in the cases of adults.

Though without any personal experience in the modification of this operation devised by the Russian surgeon Pirogoff, I do not hesitate to condemn it, for two chief reasons. In the first place, it involves the necessity for the union of two surfaces of bone, the failure of which results, inevitably, in tedious suppuration, and the ultimate detachment of that portion of the calcaneus retained in this operation. And, in the second place, if successful, it affords a smaller bearing surface than that resulting after Syme's method, and one less adapted to withstand pressure; as, instead of the thick integument of the under surface of the heel, it is that covering its point which is brought down to be borne on. The greater length of limb remaining after Pirogoff's operation can not be regarded as much of an advantage, but perhaps the contrary, as it hardly allows sufficient space for the efficient padding of whatever form of substitute is to be afterwards worn. It must be admitted

that there are objections to the operation of Syme, chief of which is the liability to sloughing of the flap. But probably the distinguished author of this method was right in maintaining that such a result was less the fault of the plan itself, than of its execution. Forcible traction, bruising, and particularly scoring of the surface of the flap, will be sure to jeopardize its vitality. As already intimated, these difficulties may be considerably lessened by sloping the under incision backwards; and should this diminish the size of the heel flap too much, it can be easily compensated for by increasing somewhat the upper or anterior flap. Generally, however, the flap afforded by this method is superabundant, and the risk of any scantiness of material for covering the ends of the bones is very small. It is fairly questionable whether there are any advantages sufficient to determine the removal of the foot at any point between the ankle joint and the tarso-metatarsal line. Chopart's, and the sub-astragaloid amputation of Nelaton, have been frequently performed, but a prime objection to them is the unopposed action of the gastrocnemius muscle, which tends to keep the front of the stump constantly tilted downwards, thereby exposing the cicatrix to irritation in walking. At the tarso-metatarsal line, however, this objection is not valid; for the sural muscles are antagonized, at least to some considerable degree, by those on the anterior aspect of the leg. At this line, the operation with which the names of Hey and Lisfranc have become associated, is performed. The points to be particularly observed in its performance are the avoidance of the extension of the dorsal incision too low on the sides of the foot, which may result in

an imperfect covering of the bones at the angles of the wound; and the allowance of greater length to the plantar flap on the inner than on the outer side, in view of the greater depth of the inner cunieform than of the cuboid bone.

But a very serious objection is urged against this operation by Dr. Cheever, of Boston. It is, that the synovial sac between the heads of the second and third metatarsal, and the two cunieform bones which support them, is continuous backwards with the articulation between the cunieforms and the scaphoid. Hence, in this operation quite a considerable extent of synovial surface is exposed to inflammation, which is apt to lead to strumous caries in subjects at all predisposed to that form of disease; and in all, to the risk of a troublesome complication, in some degree.

The removal of fingers and toes at the metacarpo- and metatarso-phalangeal joints should always be done by the oval method, which is the method involving the least amount of cutting, and the least extent of resulting scar. There is never any sufficient reason for adopting the plan by flaps, unless in cases of injury where the integument is irregularly destroyed. In amputation of the fingers through the phalanges or the phalangeal joints, whenever circumstances admit it, the operation should be by a single flap, cut from the palmar surface, thereby throwing the cicatrix on the dorsal surface, where it is most removed from pressure in the almost constant use of the hand.

Intra-Uterine Medication.

A NEW INSTRUMENT.

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Professor of Obstetrics and the Diseases of Children in the Medical College of Ohio.

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It is now pretty thoroughly settled in the minds of the most advanced and successful gynæcologists that in several forms of uterine disease, but more especially in *chronic corporeal endometritis* with its accompanying *metrorrhœa*, and sometimes *metrorrhagia*, the application of medicaments to the *endometrium* is not only of very great utility, but is absolutely essential to a speedy cure.

Great diversity of opinion and corresponding diversity of practice obtains, as to the particular agents, their strength, and form best adapted to special cases. Solids, ointments and fluids have each their advocates. At the present time, however, I think that very decided preference would be given to the fluid form of each of the leading articles employed in intra-uterine medication, provided the well-known dangers attendant upon injections of that viscus

could be averted. Of those dangers I shall briefly speak in a moment.

To my mind, the fluid form of application is preferable for obvious reasons, but a few of which need here be referred to.

1st. In this form the strength of the agent can be more definitely determined.

2d. It can in this form be more readily and certainly diffused over the entire diseased surface, thus securing a more prompt and efficient action.

3d. The quantity can be better regulated; and any excess which might enter the uterine cavity can be more readily removed.

4th. With a proper instrument the introduction is easier and safer.

In a comparatively extensive experience in the treatment of uterine maladies, I have for years felt the want of an apparatus by which these ends, and especially the last named, *facility* and *safety*, could be attained. The plan recommended by Prof. Thomas in his admirable book on Diseases of Women, viz., passing a small probe, armed with cotton-wool saturated with the fluid to be used, into the uterine cavity, has, in my hands, proven wholly unsatisfactory, for the very reasons pointed out in an able article published in the New York Medical Journal for July, 1870, by Prof. E. R. Peaslee, as follows: "Now, inasmuch as no previous dilatation of the cervical canal is here contemplated, there is no certainty that the medicament will reach the uterine cavity at all, but the probability is that it will not. But if by mere chance it should do so, it will not, if there be any

secretion or blood in the uterine cavity, after all, come in contact with the endometrium."

It is due to Prof. Thomas to say that I think Dr. Peaslee, inadvertently, no doubt, misquotes him in one particular; that is in assuming no previous dilatation of the cervical canal. In a preceding paragraph, Dr. Thomas expressly directs that as a preliminary step to the application of alteratives to the walls of the cavity, the cervical canal should, if not already ample, be dilated by sponge tents, or otherwise. In my own experience, however, and in that of many of my professional friends, this dilatation has not practically removed the difficulties. Unless it be carried to a degree that will often excite untoward inflammatory conditions of the os and cervix, more especially if in its accomplishment sponge tents be used, the cervical walls will discharge the cotton-wool of most of its saturating element. These walls, especially in the vicinity of the os internum, themselves receiving most of the medicament, a result to be deplored, particularly when they are in a state of acute inflammation as above indicated, and still the more deplorable when the saturating agent is anything near the strength of a caustic.

Moreover, in many cases, in the virgin for example, great dilatation of the cervix is quite undesirable. For, once thoroughly dilated, even the marvelous physiological properties of uterine structure are incompetent to the task of restoring to a normal condition. An apparatus for what the author calls uterine ingestion, presented to the profession and described by its distinguished inventor, Prof. Peaslee, in the article already quoted, New York Medical Journal,

July, 1870, meets many of the objections urged against the probe, being all that could possibly be desired for making applications to the cervical walls, and in my judgment much superior to any method heretofore adopted for medicating the uterine cavity. With this instrument gynæcologists are familiar; I will not stop to describe it. It possesses the advantage that through it either solids, ointments or fluids can be applied. It requires, however, very thorough dilatation of the cervix, which, in Dr. Peaslee's opinion, is no objection.

UTERINE INJECTIONS.

This is the oldest and most frequently employed of any other method for intra-uterine medication. Nevertheless, *it is of all modes most dangerous.*

Not now, I grant, with the improved syringes and greatly increased intelligence guiding their employment, by any means so dangerous as formerly; and yet, with all these improvements, I think no conscientious physician who has had large experience in this line of practice, ever performs the operation without serious apprehension as to the consequences. And this danger seems to exist, no matter what the solution employed. The preponderance of testimony obtained from the most recent sources would seem to indicate that injections of the simpler and weak solutions are fraught with greater danger than more powerful ones. Probably for the very plausible reason that the weaker and simpler agents will the more readily enter the uterine vessels and the Fallopian tubes, should they be, as I have no doubt they often are, abnormally distended. The writer once had demonstrated in the most unmistakable manner that even

with the cervical canal dilated extensively and a syringe so arranged as to assure with perfect facility the recurrent flow —the solution employed being carbolic acid two grs. to the ʒ of water—the dangers referred to were not avoided, symptoms of the most alarming character immediately supervening, followed within a few hours by fatal peritonitis.

Of course every one knows that precisely wherein this danger lies, is still a question *sub judice.* Most certainly experience has not settled what agents are safe, and what most dangerous. I think, however, that experience has shown with tolerable certainty that primary danger consists mainly, not in the chemical action of the agent employed, but in the manner of introduction. In short, after careful analysis of all the literature upon the subject which has come within my reach during the past fifteen years, patiently and carefully testing in the light of an unprejudiced experience, my humble but firm judgment is that,

1st. If quantity and force be sufficient to make the application to diseased surface effectual, there is great danger of injecting fluid into the uterine vessels.

2d. Under the same circumstances, there is great danger of injecting the uterine vessels with air.

3d. Notwithstanding the well-known fact that the Fallopian tubes have a diameter, in normal condition, of but one-fiftieth of an inch at their junction with the uterine cavity, and notwithstanding the well-known experiments of Vidal de Cassis, Hennig and Klemm, showing the impracticability of injecting these tubes through the uterine cavity, nevertheless I have no doubt whatever that they are often unnaturally distended, especially during the existence of the uter-

ine diseases under consideration. And that under such circumstances fluid can reach the peritoneal cavity through them.

In the case already referred to, I am quite positive this accident occurred.

Dr. Kammerer, of New York city, recommends* that as a prudential measure, but ten or twelve drops of a solution, especially of great strength, shall be injected into the uterine cavity at one time, and with great care, using but little force. In my judgment, this advice being rigidly followed, will generally insure safety. But unfortunately, whilst we thus secure safety, we lose efficiency of treatment.

This is obvious upon a little reflection. Except in the virgin uterus, not at all distended, or its cavity increased (and such will seldom be found in the disease demanding injections) the quantity here recommended will not approach to filling the cavity, (and herein the safety,) but if no force be used in injecting it, the fluid can reach but little more of the uterine lining membrane than such portions as may at the time be in immediate contact with the syringe nozzle, together with those portions around the os internum with which it will come in contact as it escapes from the cavity.

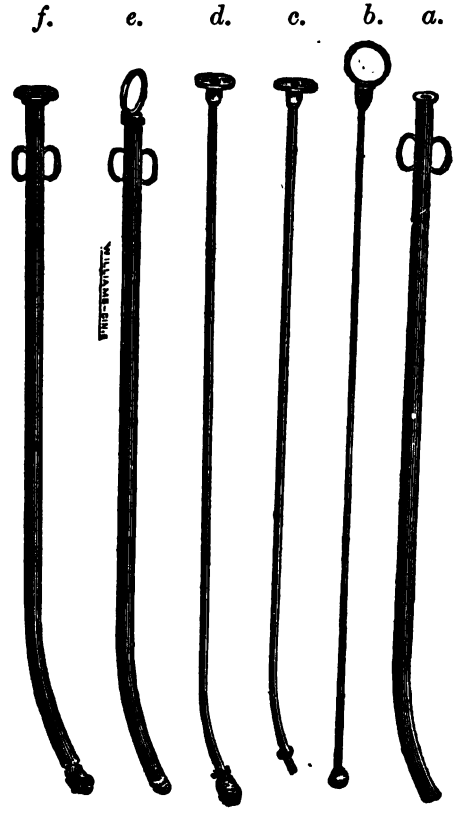
Dr. Peaslee's plan of inserting an injecting tube, through which the fluid is thrown by the syringe, is, certainly a great advance in the direction of safety, and in his hands has proved both safe and efficient; and yet, I fear that in the hands of those less experienced in these manipulations than himself, it may not always prove perfectly so.

To obviate, so far as possible, the dangers and difficulties

*See American Journal of Obstetrics, 1869.

attendant upon uterine injections, is the object of the instrument, cuts of which appear on page 226. The manner of using it is as follows: The canula (*a*) with its distal end closed by the metallic probe-pointed stylet (*b*), as is shown in letter (*e*), is passed in the same manner as we would pass the ordinary uterine sound, through the cervical canal into the cavity. The stylet is now withdrawn, and in its stead the smaller tube (*c*), armed with the sponge as shown in (*d*), is inserted, as in (*f*). Before the tube is inserted, the sponge should be dipped in water and squeezed out, otherwise, if not dampened, of course the medicament will not readily saturate all parts of the sponge. The length of this smaller tube is just sufficient to carry the sponge beyond the distal end of the larger tube. We now have a small fine sponge within the uterine cavity, borne upon the end of a small tube, which is, however, strengthened to needed degree by the canula through which it passes, so that the sponge can be carried to any part of the cavity. There is a single jet or perforation in the distal end of the smaller tube, which opens into the center of the sponge.

A small, hard-rubber syringe is now employed, the nozzle of which must fit accurately into the tube at outer extremity (which is shown in the cut as expanded for its reception,) with which any solution desired can be thrown into the sponge. The barrel of an ordinary hypodermic syringe may be substituted for the hard rubber. Indeed it has the advantage of enabling the operator (provided it is glass and graduated) to note the quantity of solution injected more accurately. It is best for the operator to practice injecting the syringe at his leisure, when not inserted, so as to famil-



INSTRUMENT FOR INTRA-UTERINE MEDICATION.

a. Silver Canula, curved, ten inches long, size same as No. 10 male Catheter; may be smaller if desired. *b.* Metallic Probe-pointed Stylet, which when inserted into the Canula, closes its distal end, rendering it smooth and easy of introduction; seen in *e.* *c.* Small Canula, made of virgin silver, therefore easily flexible, to follow curve of the larger Canula when being inserted into it. *d.* Small Canula with sponge attached. *f.* Large Canula with the smaller, armed with sponge, inserted into it, as arranged when in the uterine cavity and ready for injection. The sponge is drawn within the larger Canula before withdrawing the instrument from the uterus.

iarize himself as to the amount required to saturate it, and yet not force any drops of the fluid beyond it or through it when *in utero*. A few moments practice will enable any one to measure the degree to which the sponge shall be filled, and the force necessary.

The quantity of medicament used is absolutely within the control of the operator. If the uterine cavity is large, as often found in cases of metrorrhagia, and it is desirable, the sponge can be reinjected without withdrawing it. If it be desirable, as is often the case, to cleanse the uterine cavity before applying the remedial agent, this can be done with great facility by mopping it out with the dampened sponge, or apply a solution of chloride of sodium if preferred. It will be remembered that since the cervical walls are protected by the large canula, which is not removed from commencement to close of the manipulation, the smaller canula and sponge can be inserted and withdrawn *ad infinitum* without the slightest pain or irritation. The cervical canal may or may not be dilated before treatment of the endometrium is commenced, according to its condition and the judgment of the operator.

By this process, injection of the uterine vessels, either with the solution used or with air, is impossible. The same is true of the Fallopian tubes. And although in some cases uterine contractions will be excited by the presence of the sponge, or by the chemical influence of the drug used, yet the violent attacks of uterine colic, so much to be dreaded from ordinary injections, will not be experienced.

Of course I have nothing to say in this article as to the proper remedies, or their strength, or the frequency of appli-

cation proper in given cases. At a future time I hope to discuss the general subject. My object now is simply to present to the profession an instrument, the utility of which I have thoroughly tested, and which I earnestly hope may supply a long-felt want.

The instrument is manufactured by Mr. Autenrieth, of this city, who has been skillful and faithful in carrying out my instructions.

The Influence

OF THE

Mental over Man's Physical Forces.

BY A. B. JONES, M.D., PORTSMOUTH, O.

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We prick the finger with a needle and instantaneously a nerve of sensation gives us an intelligent idea of violence. By the aid of the scalpel and microscope we are enabled to follow up the nerve fibre to its starting point. No sooner has the sensation reached what we are taught to call the seat of the mind, the brain, than another set of nerve fibres spring into action, and at once withdraw the finger from further injury. These nerves of sensation and motion are simply prolongations of the medullary substance of the brain, spinal cord and semilunar ganglions, which find their way to every part of the body. Had no other office been assigned to the brain than the control of these forces alone, it would have a duty of highest importance to perform. But we have an office assigned it infinitely higher than that of sensation or motion. The brain is the workshop of man's mental forces; this we will neither assume or deny, holding either position beyond demonstration, but simply ask, where

are the nerves of thought? Are they wrapped up in the gray or white substance of the brain, to grow and strengthen as Prof. Agassiz advises us, by eating fish? or as Mark Twain pertinently suggests, a whale? Or are they lying loose in the front and large portion of the brain, the one-fourth of which I have seen a boy lose, from a fracture caused by a gunshot wound, without affecting his mind? But the object of this paper is not so much to hunt up the exact location of man's mental forces as to show their influence upon physical organs, the exact location of which we do understand, together with their functions. That a man may enjoy good physical health with a very feeble intellect, is a fact so well established that but few will controvert it. But the converse will not hold good; the immortal part of man, that which was made in the likeness and image of the Infinite, is dependent for its proper, full and vigorous development upon the healthy and well-developed condition of all the physical organs.

A man is no more capable of reasoning correctly who is a confirmed hypochondriac—which we have been taught to believe has its origin often in the derangements of digestion —than he would be with softening of the brain, or, if you please, with a tumor on the brain. Yet the mind, so to speak, may dwarf the man physically to such an extent as to cut off its own supply; and it is this, as guardians of the health and preservation of our race, that we are daily called upon to consider, and, it may be, to correct. The influence of the mind is more frequently, and perhaps, more directly, felt upon the stomach than any other organ. Who of us has not sat down to dinner with a keen relish for the good

things set before us, when some sudden news, depressing, perhaps, in its character, has in a moment induced satiety. Intense grief or fear is said to have changed the color of the hair in a single night from black to white. An over anxious feeling, coupled with hope and doubt, is very apt to increase the secretion of the kidneys. Prurient thoughts will increase the secretion of semen; the cry of a young child will start the lacteal flow in the mother; the fear and dread of a cancer has, without much doubt, converted a simple fibrinous tumor of the breast into a malignant one; putrid or disgusting objects may produce emesis; and there is but little doubt but that the mental emotions may be so operated upon as to cause an attack of diarrhœa. And so we might go on until we had enumerated nearly all of the secreting organs of the body. Men in good health meet with some little reverse in their business, they grow anxious about it, lose sleep and appetite, then they worry because they can not either eat or sleep, until they become sick. The physician is told everything but the truth, when he proceeds to worry them additionally with drugs. When death supervenes, they die of "softening of the brain," a very convenient disease for men to die of; the skull is so thick that you can not conveniently feel the brain through it, and then if an autopsy is made, why, the brain is always sure to be soft, which proves eminently satisfactory to the friends.

A sick person grasps the thoughts of a physician the moment he enters their chamber, and holds them as if they were things tangible, just as he does the outstretched hand, only he holds them long after the doctor has gone on his

weary way. Hence the quiet, cool, easy, cheerful, graceful, self-possessed, confident doctor is always the successful practitioner. A physician once wished to compliment a lady who had brought a floral tribute to one of his sick patients, and while looking upon the beautiful bouquet of flowers close to the blanched cheek, he politely remarked that he once knew life and death poised in the balance, and the delicate odor of the citron turned the scale in favor of life. While this may not be literally true, it is not without its effect, and it is as much the duty of a physician to look after and control that spirit essence, or subtle essence, the mind, as it is to know that the stomach has been relieved of its noxious bile, or that the fevered pulse now keeps pace with his own. The finest medical lecture ever given, at least in so short a compass, was by Solomon; it is this, "A merry heart doeth good like a medicine, but sorrow is as rottenness in the bones."

It is a common saying that you must have faith in a doctor, or his medicine will not cure you. Now confidence and trust in a physician's skill is, no doubt, oftentimes fraught with good results. The solution of this is that the mind is relieved, in a measure, of its anxiety — ceases to concentrate itself upon the diseased organ; but this is not so much a cure by faith, as it is a cure by mental over physical force. It is not only that one's own physical organs are influenced by mental force, but that through the latter, or nerve force, or mesmeric force, one's mind exercises a material influence over another's physical organs. This pertinently suggests the necessity of a thorough study and knowledge of human nature, by the well-educated physi-

cian. It is not unfrequently the case that we find physicians eminently qualified to practice their profession who are very unsuccessful in their practice. Why is this? It is certainly not because their diagnosis has been faulty, neither is it because improper medicines have been used; but it is because the mind of the patient in stretching forth its delicate tendrils—may be bruised ones—found nothing to refresh and strengthen them. Simply because the souls of the physician and patient, or their minds, did not seek to get acquainted with each other. This certainly is the chief cause of their failure, and tells us very plainly that our minds, our souls, our thoughts, must be administered, as well as our drops and pills, if we would successfully combat disease.

We occasionally meet persons with imaginary diseases—imaginary in the beginning, but real in the ending. Again, there are some persons who have had real disease, been thoroughly cured, and yet their minds, so to speak, remain so full of the disease that they can not be made to believe they are well, and a depressing influence is thus brought to bear upon their general health, closely allied, if not akin, to the trouble they have been cured of. Now, blister plaster and quinine will not relieve this class of patients; they can only be cured by administering to what we have been taught to call a diseased mind an equal amount of healthy mind. How is it to be done? Well, there comes the rub; it is enough for my present purpose to say it must be done. Association occasionally develops disease. For instance, chorea. A boarding-school miss gets sick, recovers in a degree, but there remains with her an involuntary motion of

some of her limbs, beyond her control. This occasionally extends through an entire class, almost as much so as rubeola or pertussis would. This, of course, I do not class as a disease of the mind, but rather as one that may be caused by acting through the mind. One other class of patients, and I am done. A patient comes to you, a highly intelligent gentleman, a lawyer perhaps, may be a divine; he has read a great deal, he has thought a great deal, and no doubt but he knows a great deal in his line. He holds in his hands an advertisement that he has cut out of a newspaper of some patent medicine man, or it may be a leaf out of Jayne's almanac; possibly some disciple of Hahnemann has sugared him up by his description of the aches and ills that flesh is heir to. Now, he wishes you to distinctly understand that he does not believe in patent medicines, and as for those little pills, he thinks nothing could be more insignificant, unless, perhaps, it might be the knave or ass who peddles them. "But then," continues he, "they have described my feelings better than I could do it myself, and it may be possible that this is just what I need." You examine the case carefully, and find instead of his needing a "Liver Invigorator," "Lung Balsam," "Blood Purifier," or "Catarrh Snuff," that he has simply overtaxed himself, both mentally and physically, until he can easily imagine aches he does not feel. But there is still another, and perhaps better reason; it is this, nearly every patent medicine man describes about the same class of symptoms, in about the same words, no difference what the disease he is describing. This is not noticed by the general reader. It requires only a little careful wording, with a moderate

degree of ingenuity, to tell a man about how he feels, for there is scarcely any sick man who feels well. A little address may be well in the beginning; for instance, preface your remarks with, "You know from your own personal observation that he is a man who will not give up to trifles; that he has a general feeling of languor and debility all over; an occasional chilliness, followed with more or less fever, flashes of heat, a general aching all over, an occasional palpitation of the heart, a little nervous, will startle suddenly if frightened, irregular appetite, can not sleep well, a little running round of the head if he stoops down and rises up suddenly; after eating a hearty meal he gets up from the table feeling full." Now, this will satisfy nine men out of ten. Of course, I need not here remark that this is all absurd, but nevertheless it is kindred stuff, through patent medicine advertising, that causes a great deal of the diseases of both the mind and body that we are called upon to treat, and I merely refer to it to illustrate the action of the forces of which this paper is the subject.

The Relation of Physiology to Practice,

Illustrated by Some of the Year's Contributions of Physiology to Practical Medicine.

BY JAS. T. WHITTAKER, A.M., M.D., CIN'TI.

Professor of Physiology in the Medical College of Ohio, etc.

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Physiology is the Pioneer of Physic. The difference between ancient and modern medicine is the possession by the latter of a blazed-out line of march. The rational practice of to-day is the applied science of yesterday, and what is known as the pure science of to-day will be rational practice to-morrow. The willingness and the ability to recognize in the foreshadowings of scientific investigation the outlines of future practice, are the distinguishing characteristics of the modern physician.

It would be a privilege as pleasant as profitable to stand as an interpreter of the discoveries in science whose use is still as obscure as though spoken in an unknown tongue, but it is out of the range of individual capacity to more than intimate the practical applications that may be made of the results of recent investigations in medical science. There is a volume written in proof of their vindication by time. It is the swelling volume of the History of Medicine.

It is mine to-day the privilege, equally pleasant and profitable, to present some of the practical applications already made from the physiological investigations, *pur et simple*, of simply the past twelve months. The possibilities of every fixed and definite discovery are of course simply incalculable, and the chronicle of results, absolutely realized in the past twelve months alone, would transcend the limits of the occasion. I propose, therefore, to notice, briefly, a few of those investigations which have been turned at once to practical use, and in which the relation of cause and effect is too patent to be denied.

First I select, then, as in the undisputed domain of physiology, the recent amplification of results obtained from the study of the properties of the stomach digestive juice.

The definitely ascertained action of the gastric juice upon certain elements of food is already sufficiently known, and the value of the utilization of this discovery in the treatment of digestive diseases, in the dietary regulation for all diseases, indeed, is nowhere underrated. This of itself was a reward in recompense sufficient for all the labor of research expended. But the benefits of this patient investigation do not stop here. This same digestive action has been brought to bear, first, by the physicians of Italy, upon abnormal growths, hitherto unamenable to treatment, and with results in direct practical confirmation of previously established physiological laws.

D'Arpem (L'Union Medicale, September 2, 1872, from L'Imparziale,) gives the particulars of a case of ulcerated cancer of the rectum, which had resisted all other means of treatment, and which threatened death, with all the horrid

prodromata of this most loathsome disease. Having obtained 25 grm. of gastric juice from Prof. Schiff, he made it into an emulsion with glycerine, which was then administered per enema. This treatment was repeated three times daily for twenty days, when every symptom had subsided and health was perfectly restored. Lussana, an Italian physician, widened its range still further in the treatment of malignant neoplasms, and Stohr of Wurzburg (Schmidt's Jahrbucher, September, 1871,) has given it an extensive and satisfactory trial in both cancer and syphilis. He uses the juice obtained directly from the dog by gastric fistula.

Few facts illustrate more clearly the benefits of scientific investigation than the practical applications that have been made of the discovery of the action of ergot upon the contractility of muscular fibre. Here, too, as in most of the examples which I shall have selected in proof, the scientific experimenters little surmised themselves the really wonderful results which would spring from their investigations.

Dr. Meadows (*Practitioner*, December 11,) exhibited conclusively the action of ergotin by injecting this substance subcutaneously into the web of a frog's foot, previously extended under the microscope. Brown-Séquard observed, further, that the vessels of the pia mater and cord were contracted in the dog, and the reflex action of the cord was thereby diminished. Holmes next (Archives de Physiologie,) finds that ergot contracts the minute vessels by an action on their muscular walls, and this contraction augments the blood pressure in the large vessels. These were the positive demonstrations of science.

Fortified with these results, v. Langenbeck argued (Ber-

lin Klin. Wochenschr.,) that as ergot induced contraction of the smooth muscular fibre, it becomes an active agent in producing hemostasis. Two cases of aneurism, one in the right supra-clavicular fossa, and the other of the right radial artery were successfully treated by this means. Dr. Dutoit, of Berne, (Langenbeck's Archiv., vol. xii, No. 3,) has successfully repeated this method of dealing with aneurism. Soon after this, attention was called to the successful use of this agent in hemoptysis. The Edinburg Medical Journal (July, 1870,) calls attention to the case of a patient who had bled thirty-six ounces from the lungs in a few minutes, when the subcutaneous injection of ergotin checked it completely in three. Dr. Allan Jamieson (Brit. Med. Jour., June 3, 1871,) records a case in which the same treatment was successful, whereupon Dr. Ritchie, of Manchester, from whose report the above cases are quoted, treated some eight different cases, the remedy being successful in every instance.

Not very long after these reports, Prof. Luton signalized public attention, in a note to the Paris Academy of Medicine, (Séance, October 10, 1871,) to the remarkable value of this agent in the treatment of an obstinate and fatal epidemic of dysentery prevailing at Rheims, the reaction in some severe cases marked by the gravest symptoms, as algidity, being as prompt as energetic. Numerous reports were then chronicled on all sides, of its exceeding efficiency in arresting menorrhagia, and finally Dr. Paul Voigt (Berlin Klin. Wochenschr., March 4, 1872,) has succeeded in the same way in perfectly curing a number of cases of that hitherto incurable malady, varicosities of the veins of the leg.

All these observers make special acknowledgment of their direct indebtedness to the pure investigations of science.

The principle which is the text of my paper finds a handsome exposition in the thoroughly practical results developed from recent scientific investigations into the action of phosphorus upon organic life.

During the past year a celebrated German chemist, Frankland, commenced some observations upon the influence of phosphorus upon the development of germs in water.

In the *Zeitschr. f. Analyt. Chemic.*, 1871, vol. 2., p. 229, this distinguished scientist exhibits that the germs of organisms can not develop without the presence of phosphorus, phosphoric acid, some phosphorus salt or phosphorus in some form or other. "No matter how full of germs unclean water may be, no development of these germs can take place if no phosphorus be present. The author is led so far in his conclusions, indeed, as to make the sweeping assertion that the well-known maxim, 'without phosphorus no thought,' (referring to its long-established presence as a necessary constituent of brain matter,) should read 'without phosphorus no life.'"

This was the scientific fact.

From so broad a generalization, if legitimate, and lawful it has proven to be, it is not by any means so difficult as in several other of the examples cited to deduce practical applications in the treatment of disease. An article in a late number of the London *Practitioner*, February, 1872, brings out the proof in full.

Its author, Dr. Black, in recommending the employment of a phosphorus compound, the lacto-phosphate of lime, in

the treatment of fevers, etc., remarks as follows: "I was led to the employment of this salt by the physiological study of its action on all living organisms. Botanists have shown that the very existence of albuminoid substances is linked with the presence of the phosphate and is everywhere found in direct ratio to the quantity of this agent, so that the more strongly nitrogenized food was precisely that which contained the more phosphates. They have found out this substance in great abundance in the bud and growing leaves; they have seen it decrease in the fully developed organ and take its way to the grain, where it becomes concentrated in view of the future development of the embryo," etc.

Bousingault, Lehman and Mayer have announced the opinion that phosphate of lime is indispensable to the organization of albuminoid substances into cellules. In pregnancy the phosphates disappear almost completely after a few days from the various excretions, while in the pelvis, and often in the cranium, osteophytes are found to disappear only at the beginning of lactation. Why then do not favorable results follow their administration in rickets, osteomalacia, fractures, etc.? Simply because the preparation invariably administered was the pulverulent phosphate, a salt of scarcely no diffusive power. An artificial imitation of the precise salt, the lacto-phosphate, a substance representing exactly the composition of a portion of bone rendered soluble and easily absorbable had all the desired effect. "Thus is furnished an aliment, and an article of food and a medicament of highest value in the affections mentioned, and more especially in acute adymamic affections and protracted convalescence."

Quite recently, indeed, the theory has been advanced that phosphorus is one of the elements that form the source of nerve force. A late number of the Journal of the Franklin Institute, January, 1872, gives the views and experiments of St. Clair Gray, who maintains that nerve force is a form of electricity engendered by the action of the alkaline blood on the phosphorus and sulphur in different organs of the body. This theory is not advanced as proven; in fact there are more arguments against it than in its favor—the combinations in which these elements exist in the body, for instance—it is brought forward only to exhibit the open sea before every vessel when once it is properly launched.

A very beautiful application has very lately been made of Longet's and Séquard's curious experiments to show that the contractility of muscles depended upon their blood supply.

Longet, it will be remembered, tied the abdominal aorta in a number of dogs; voluntary muscular contractility ceased in a quarter of an hour, and all irritability was lost in five hours. When the blood was restored after two or three hours by removing the ligature, irritability, and finally voluntary movement returned.

Brown-Séquard's observations were made upon two men executed by decapitation. After cadaveric rigidity had supervened, some thirteen hours and ten minutes after death, fresh defibrinated human blood was injected into the arteries of the hand. This injection was repeated several times during the ensuing half hour. Irritability returned in ten minutes after the last injection and remained for three hours and a quarter. In the second observation the blood of the

dog was used, and the experiments were made upon the muscles of the arm. Irritability was restored in all the muscles and was present, the cadaveric rigidity having disappeared, twenty hours after decapitation.

From so simple though self-evident a proposition as this connection, it would seem difficult to evolve any direct practical application, yet such use has been made of it in now a number of cases as to dispense, to some extent at least, with all the dangers of anæsthesia.

The Lyons *Medicale,* April 28, 1872, contains the following note on a new means of combating muscular contraction: "Every one is familiar with the resistance offered by muscular contraction in the reduction of dislocations or of fractures with displacements of the fragments. In order to avoid this difficulty, resort is had to reduction as soon after the accident as possible to profit by the condition of stupor existent at that time. After this period, etherization becomes necessary. M. Broca, however, has devised a means which is void of the inconveniences of anæsthesia; it is compression of the principal artery of the wounded limb. The muscles deprived of the blood necessary for the exercise of their functions by compression of the basilar or femoral arteries, are unable to contract. By means of this practice M. Broca has already succeeded on a number of occasions, without recourse to anæsthesia."

Nowhere was the impotence of the clinician more painfully palpable until the physiologist unraveled its mysteries, than in the diseases of the nervous system, and here more especially may the triumphs of the past decade of years, even of one year, be referred to with indisputable title of

first possession. But a few years ago there was more profound ignorance on the subject of nervous diseases than in any other department of medicine. A few years more, step by step, simply by experimentation, at first upon lower animals, the law of Bell was announced that it was only necessary to take into consideration all the nerve fibres affected, to be able to locate the seat of the disease at that point where the fibres are in anatomical connection. By aid of this law we are enabled, Benedikt, Transact. Vienna Soc. Physicians, June, 1871, to distinguish apparent from real peripheric lesions, and by regard, in connection with it, of the laws of physiological and pathological anatomy with the direct results of physiological experiments, to formulate in definite laws the nature and character of the disease.

If we turn now to the nerve fibres themselves, we are attracted by the most important discovery of a new set of elements having the function to preside over nutrition, the so-called trophic nerves, nerves which regulate the secretive and absorptive processes of the economy.

Ludwig and Wittich had shown how these nerves preside over salivary secretion, and Goltz has exhibited to us how they regulate the nutrition of the skin, its shiny moist condition being preserved so long as connection with the central nervous system remains intact. Pfluger also has experimentally demonstrated the direct connection of nerves with the gland cells of the salivary glands as well as those of the liver and pancreas. Still later discoveries have taught us further, that not only gland cells, but also cells of other tissues, especially the epithelial, contain terminations of nerve fibres. All these cellular nerves are of essential

influence on the vitality of their cells as well as on the transformations of constructive and retrograde metamorphosis, and through them we are possessed of a surprising confirmation of many pathological conditions, as, for instance, the corneal affections in the neuroparalytic troubles consequent upon lesions of the trigeminal nerve. Thus also is explained that strange disease, Morbus Basedowii, among other hitherto inexplicable phenomena.

The practical benefits of these discoveries are beautifully given by Eulenburg, of Berlin, (Lecture before the Hufeland Soc., October 27, 1871,) in the new and valuable points that may often be obtained in more accurate local diagnosis by the separation of vaso-motor and trophic symptoms. In lesions of peripheric mixed trunks, in the rule, trophic and vaso-motor symptoms will manifest coincidently or in succession. Nearer the center, however, the vaso-motor and trophic tracts separate from each other as distinctly as do motor and sensitive fibres. Just as there are separate centers, then, for the innervation of the heart and blood vessel tonicity, so there are also separate centers for the regulation of animal heat and nutritive interchanges, particularly of the nutrition of muscle. Thus are located the lesions of progressive muscular atrophy in the anterior column of the cord by Grainer, Bamberger, Joffroy and Rosenthal; glosso-labial pharyngeal paralysis by Leyden as a chronic myelitis in the upper cervical region of the cord with degeneration of the lateral columns and fatty atrophy of the anterior roots; and progressive muscular hypertrophy by Barth as a degeneration of the anterior horns and lateral columns. The spinal paralysis of childhood has been localized by

Charcot, Parrot, Jeffroy and Vulpian, who all found, and they were unanimous in description, degenerative changes in the anterior lateral columns as well as in the anterior roots of the spinal cord.

May we never forget, writes Eulenburg, that the pathology of the nervous system owes its brilliant inception and its entire development to the fact that its indomitable founder has bound it indissolubly with the physiology of the nerves.

But here I must bring my remarks to a close. I had intended to make something more than passing reference to the recent successful attempts—in the treatment of diabetes by electricity—to give practical application to Bernard's discovery of the glycogenic center in the brain, as recently worked out, more especially by Cyon, who has demonstrated the origin in this center of the hepatic vaso-motor nerves, but I am already transgressing the limits of my time.

It matters little to the world at large how these practical applications are made, whence they are derived. It matters nothing, as the patent laws put it, whether the discovery be the result of luck, labor or inspiration, and examples of each might be cited in medicine; but it matters much for the future of medicine that we recognize the fact that a revelation of accident is a great exception, while the results of experimentation are the rule.

Splints and Dressings

FOR TREATMENT OF

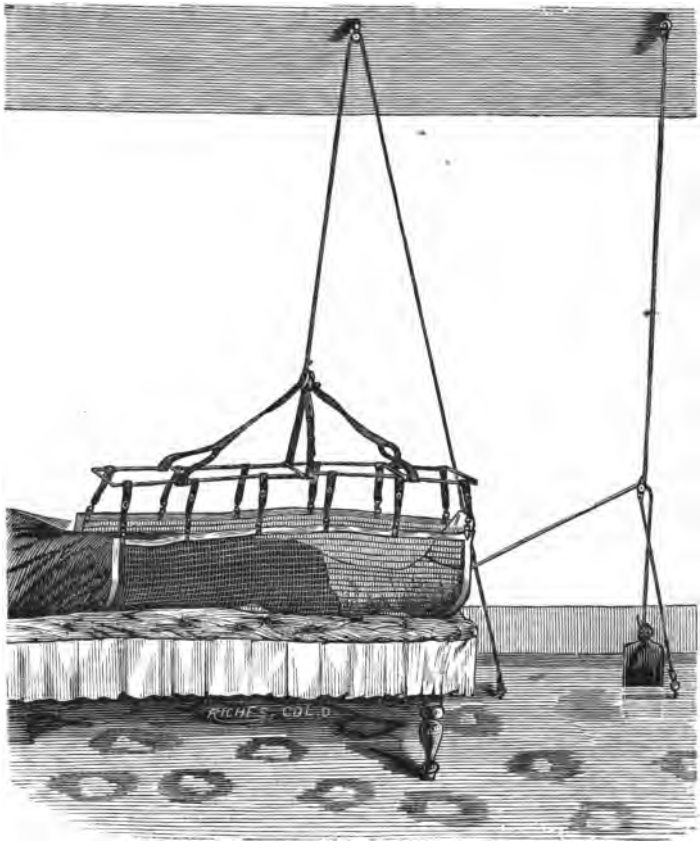
Fractures and Injuries of the Limbs.

BY NORMAN GAY, M.D., COLUMBUS, OHIO.

[The following paper, with cut, was received too late to be inserted in its proper place in the Transactions. J. W. H.]

MR. PRESIDENT AND GENTLEMEN OF THE OHIO STATE MEDICAL SOCIETY:—I take the liberty this morning to call your attention for a few moments to a set of splints and dressings for treatment of fractures or severe injuries of the limbs. During the Atlanta campaign in 1864, we had many cases of compound fractures to move in ambulances. To carry them easily and safely, the limbs were suspended in a piece of canvas or of old tent, in the following manner: We took a piece of tent cloth eighteen or twenty inches wide and three feet long; the edges were tacked on strips of board about two inches wide; pieces of bandages were tied to the board and attached to a loop of rubber tube, which tube was then attached to the top of the ambulance. The limbs were dressed with short splints and laid in the canvas, the canvas suspended to the top of the ambulance, when they were transported in comfort and safety many miles, the rubber tube breaking the shock of the ambulance in passing over rough roads. The legs laid so easily, and the fractures

so seldom displaced, I thought it better to suspend the limbs from the bed in all cases. By so doing, the patient is enabled to move to any part of the bed without assistance. He can get on an ordinary chamber or sit up without displacing the fracture. In fact, it is almost impossible to get it out of place in this dressing. We avoid all danger of bed sores or wounds from the dressing, pressure of heel, etc., besides keeping the bed and patient clean. The drawing represents



the leg suspended with the adjustable pulley and extending band as usually applied.

To make the splint, take eight by eight No. 22 wire cloth three feet long, eighteen to twenty inches wide; bind the edges with leather or cloth, with five or six loops or pieces of tape on each side. Then make a frame of iron or wood three feet long, four inches wide at one end, and five at the other; this should have three bands to attach to suspending pulley. After the leg or thigh is dressed with short splints of binders' board, the limb is laid on the wire cloth with proper bedding, and the tapes tied to the suspending frame of iron or wood, when the leg is lifted clear of the bed. The pulley over which the extending cord is passed can be had at almost any hardware store. Take the pulley that has a screw hole at each end for fastening it to its place; run a cord through both holes, and then make the cord fast to the ceiling and the floor with No. 4 screw eyes. The pulley will retain its place on the cord, but can be readily moved up or down as required, to keep the line of extension in line of the limb. To meet all classes of patients, one would need, say, three sizes of splints; one three feet by twenty inches wide; one two feet by sixteen inches wide; one eighteen inches by twelve inches wide. I have treated with these splints since 1865 all classes of fractures and severe injuries of the limbs with great comfort to the patients and with satisfactory results; besides saving many an hour's hard work for my back, as I can undress and examine and dress in a very small part of the time usually required with any of the old dressings. In the class of cases requiring the erigation of cold water, no plan of dressing can equal it.

REPORT

OF

Committee on Obituaries.

B. B. LEANORD, M.D., CHAIRMAN.

REPORT

OF

Committee on Obituaries.

B. B. LEANORD, M. D., CHAIRMAN.

GEORGE C. BLACKMAN, M.D.

George C. Blackman, Professor of the Principles and Practice of Surgery in the Medical College of Ohio, died of hepatic disease, July 19, 1871. It is difficult to speak in suitable terms of this distinguished man, whose reputation in his profession is world-wide. As a skillful surgeon he had few equals. He was learned and skillful in all that pertained to his profession; his skill was the result of hard and continued application to the study of all that tended to develop the real mastering of his undertaking. His example will be of great value to young men beginning an educational career. It was through great deprivation and self-denial that he attained so eminent a place in science. He suffered nothing to daunt him or change his course.

After graduating at the University of New York, he went to Europe, where he spent some time in study, and engaged the personal and permanent friendship of the celebrated Sir William Furguson, who in his last work on

surgery, speaks of Dr. Blackman as his friend, and quotes him largely.

Wherever Dr. Blackman exercised his profession—on the sea, in the army, in the hospital, or as teacher of medicine and surgery, he was regarded as of the highest authority. He enjoyed while yet a young man the friendship and confidence of the most distinguished surgeons of America, Mott, Parker, Gross and others, and at the request of Dr. Mott, edited his edition of Velpeau's Surgery, in which he gave evidence of a very remarkable familiarity with surgical literature. He has been termed a "walking encyclopædia of medical literature." His last message to the profession was, "Tell them for *me* and *from me* do not postpone becoming religious as long as I have done. Tell them, *urge* them, to embrace the Gospel and seek religion, and prepare for death; and tell them how happy I am since I have made my peace with my Maker." So passed from us a great light.

ISRAEL S. DODGE, M.D.

Israel S. Dodge was born in Waterford, Washington county, Ohio, October 6, 1807, and died in Avondale, March 1, 1872, in the sixty-fifth year of his age. He graduated at Kenyon College, and came to Cincinnati to study medicine, and graduated from the Ohio Medical College. He began the practice of medicine in the city of Cincinnati during the prevalence of the cholera scourge of 1832-3. Although at that time an undergraduate, the urgency of the times demanded action, and it speaks well for his position and knowl-

edge that he was urged to do so by his preceptor, the late Dr. Drake. The degree was conferred on him in 1834, and he continued to practice his profession in the city of his adoption until his death.

He was a most devoted friend, honest and true in all the relations of life. His professional brethren who were in constant association with him bear this testimony. His memory will be long cherished on account of his kindness of heart and readiness to help by deeds rather than words. He was really the friend of the poor. Another declares he "never knew a man more free from envy, hatred, malice, and all uncharitableness." Such a man ought to be remembered and honored after his death. He was "the good physician, the faithful friend, the honest man, and devoted Christian." He has passed away; such men die too soon. "Mark the perfect man, and behold the upright, for the end of that man is peace."

HENRY E. FOOTE, M.D.

Dr. Foote died July 12, 1871, in the forty-seventh year of his age. He studied medicine with the late Prof. Shotwell, and graduated in the Medical College of Ohio in 1847, and was appointed a resident physician to the Commercial Hospital, an honor highly appreciated by young graduates, as it is evidence of high standing, and gives ample opportunity to begin a professional career in intimate association with distinguished members of the profession. He was afterwards made an assistant surgeon of one of the Ohio regiments in the Mexican war. He there contracted typhoid

fever, followed by chronic diarrhœa. After his return home his health was measurably restored, and he accepted the chair of Chemistry in the Miami Medical College, and in 1857 the same position in the Medical College of Ohio. He was surgeon of the Twenty-second Ohio regiment for three years with great acceptability. In this service his diarrhœa returned and his health became greatly impaired, from which he never recovered. He filled at different periods the chairs of Anatomy, Surgery, and Special Pathology in the Miami Medical College, and afterwards was connected in a professional capacity with Longview Asylum. He was a man of amiable disposition, educated in his profession, a skillful operator, and valuable in consultation.

A. S. WEATHERBY, M.D.

Dr. Weatherby died in Cardington, Ohio, November 23, 1871, aged 33 years. He studied medicine in Galion, Ohio, and graduated in the Cincinnati College of Medicine and Surgery in 1862, and began the practice of his profession in Cardington. He died of phthisis pulmonalis, and contemplated the event with composure; being an earnest Christian, he looked forward without fear of death. He was highly esteemed by his professional brethren.

W. T. TALIAFERRO, M.D.

Dr. Taliaferro died at his residence in Cincinnati, on the twenty-first of March, 1871, aged *seventy-five* years. He was one of the pioneer physicians, and a connecting link

between the past and present. He was well known throughout the country as a distinguished physician, and enjoyed the fullest confidence of his professional brethren. Dr. Taliaferro had a wide-spread reputation as an oculist, a distinction he richly deserved. In the war of 1812 he gallantly came to the rescue of our country in the time of its need, and side by side with the heroic Perry on Lake Erie "met the enemy and made them ours."

From the resolutions passed by the Cincinnati Academy of Medicine we learn that he, having served out faithfully his day and generation, preserved his mind unclouded to the last, and descended with Christian resignation into the dark valley of the shadow of death, that to him who had so often let in the light and beauty of earth upon the benighted vision of others, some of whom were even born blind—to him it was permitted, amid the anguish of dissolving nature, to open the *eye of faith* upon that other and brighter world, where angels gather immortality fast by the throne of God.

THOMAS CARROLL, M.D.

This well-known and distinguished member of the Ohio State Medical Society, died near Cincinnati, on the twelfth day of March, 1871, in the seventy-sixth year of his age. He was born in Ireland, and came with his parents to Columbiana county, Ohio, when less than ten years of age, in 1804. Nature endowed him with strong, self-reliant faculties, and he grasped every available means to enrich his mind, and lay broad and deep the foundation for professional usefulness. He graduated at Lexington, Kentucky, at what

was then the only school of medicine west of the mountains, east of the Mississippi valley. He at once engaged in the active duties of his profession, and continued until his death. He was distinguished for his originality, the force of his character, and his unblemished integrity. Dr. Carroll was reared in the tenets of the Friend-Quaker brotherhood. He was a good and true man, and has left an example which may well be imitated.

Brethren, let us remember the admonition, "Be ye also ready, for in such an hour as ye think not, the Son of Man cometh."

WILLIAM C. HALL, M.D.

[Notice by Dr. E. B. STEVENS.]

Dr. Hall was born in Adams county, Ohio, September 2, 1834, and died at his residence in Fayetteville, June 5, 1872.

Dr. Hall commenced the study of medicine in 1853, in the office of Dr. David Noble, then at Sugar Tree Ridge, now of Hillsboro. He continued in the office of Dr. Noble for about three years, when he graduated at the Starling Medical College of Columbus. During his pupilage, Dr. Noble writes that he excelled "in faithfulness, diligence and strict integrity. He was a general favorite, and much esteemed by all my patrons, and during the last year of his pupilage he aided me very much in my practice, as my patrons made but little difference in their election who attended on them in their illness, Dr. Hall or myself."

Dr. Hall selected Fayetteville, Brown county, as his home, and has throughout his professional career enjoyed very largely the confidence and friendship of the community.

For the past dozen years he was physician to the "Ursuline Convent," in the vicinity of that village.

For about six years past he had been the Secretary of the Ohio State Medical Society, performing the duties of that office with the same careful fidelity that characterized all his labors. The members of the Society were personally attached to him, and the announcement of his death brings universal regret.

He was a convert to the Catholic faith in religion, and was a true, conscientious Christian. In all his relations in life he was a worthy, amiable and correct gentleman.

ABEL CARY, M.D.

[Notice by Dr. A. C. MILLER.]

Dr. Cary died at the residence of his brother-in-law, Jonathan Stanley, near Salem, Columbiana county, Ohio, on Tuesday, January 9, 1872, of injuries received, aged sixty-two years.

While driving into the town of Salem, on New Year's morning, from his residence, situated a few miles in the country, his horse took fright and suddenly wheeled, throwing him from his seat on the sulky. His left foot became entangled in the cross bars, his body prostrated under the axle, in which position he was forced to remain while his affrighted horse ran a distance of nearly a quarter of a mile, dragging him upon the frozen ground, fearfully mangling his head and face, breaking his right leg below the knee, and injuring him internally. When found he was almost exhausted; was carried to the nearest house, where his

injuries were promptly dressed by his partner, Dr. J. L. Firestone, *assisted by himself.* He rallied from the shock, and for a time hopes were entertained of his recovery. But the injuries to so feeble a frame were too great, and after little more than a week's suffering, "this mortal put on immortality," and his work on earth was ended.

Dr. Cary was born in Smithfield, Jefferson county, Ohio, on the —th day of September, 1809. He read medicine in the office of Dr. Williams, of Salem; was a man of sound judgment, a close student, an accurate reasoner, and the study of medicine was well adapted to his cast of mind. Having finished his preliminary course, he found his means exhausted, and was forced to enter into his profession at once as a means of support. Consequently he became the partner of Dr. Robertson, of Hanover, Columbiana county, where he continued in the practice for eight years, during which time he applied himself very closely, and in the spring of 1838 he graduated at the Cincinnati College of Medicine, which then numbered in its faculty men of rare abilities, who have since won for themselves national reputations. Under the influence of such teachers as a Drake, a Gross, and a Parker, his zeal was heightened and he soon showed himself no unworthy pupil.

In 1843 the partnership between him and Dr. Robertson was dissolved, and he removed again to Salem, where for twenty-nine years he enjoyed an extensive and lucrative practice. In 1859 he formed a partnership with Dr. Keeler that continued eight years, at the expiration of which the firm of Cary and Firestone was formed and continued up to the time of his death.

The Doctor was a self-made man, relying only upon a feeble constitution, great perseverance, and indomitable energy for success. Few men of such weak physical powers ever perform such an amount of hard labor. Early in life he conceived the idea that the most important part of self-culture and the promotion of health was the control of taste and appetite. Consequently he regulated these in such a manner that he procured for himself a reasonable degree of health, notwithstanding his feeble and slender frame. As he expresses it, "sensuality is the abyss into which many are plunged and lost." "One great curse of wealth was that it pampered sensuality and drowned intellect."

Shortly before removing to Salem, he married Maria P. Miller, of Brownsville, Pennsylvania, who, with five sons and a daughter, lives to mourn his loss.

A leading physician and surgeon in northeastern Ohio, his loss will be deeply felt by the community at large, and his colaborers in the profession, who so often availed themselves of his large experience in consultations.

He was a member of the American Medical Association and of the State Medical Society, and always manifested a deep interest in local associations having for their object the increase of medical knowledge and the elevation of the professional standard.

He was a member of the Society of Friends, and his religious faith, while marked by the tender charity and liberality which characterize that denomination, held firmly the great principles of Christianity that are recognized by all.

Thus are we called upon once more to record and mourn the loss of one of our profession's best and ablest men.

Although full of years, his mind was clear and discerning; nor had his energy forsaken him. And in the evening of life, when the impulses of our nature are apt to becloud the horizon and cast a gloom over approaching decay, his age was characteristic of his manhood, and he sank into the embrace of death honored and beloved by all, esteemed and mourned most by those who knew him best.

GEORGE W. BOERSTLER, M.D.

[From the LANCET AND OBSERVER, November, 1871.]

Died, at his residence, in Lancaster, Ohio, on Wednesday morning, November 11, 1871, Dr. George W. Boerstler, aged 78 years, 11 months and 22 days.

The following notice of Dr. Boerstler is taken from the Lancaster Eagle:

"Dr. Boerstler was born at Funkstown, Washington county, Maryland, on the 19th day of October, 1792. He emigrated to this city in 1833, where he resided ever since, and where he devoted thirty-eight years of his active and untiring life to the arduous and responsible duties of his profession. In his death, that profession has lost one of its brightest ornaments, and the community a most worthy, upright, and useful citizen. As a medical practitioner, his place can not be supplied. His whole soul was absorbed in the great duties of his high calling. Neither age or disease deterred him from a prompt and faithful response to the constant demands of his afflicted fellow-beings, whether high or low, rich or poor, deserving or undeserving. He never for a moment hesitated in hazarding his own health

or life in his anxious and generous care for the health and life of others. The news of his sudden death pained many a grateful heart in this community; for every recipient of his kindness, his skill, and his fatherly attention, deeply felt that they had lost a friend whose place it would be impossible to fill. With him, duty well performed, in all its relations, was the great aim of life—kind and indulgent as a father, affectionate and regardful as a husband, he equally filled the character of a good citizen, an honest man, and a tolerant and punctilious gentleman. He possessed a strength of will and a firmness of purpose which no adversity, however trying, no calamity, however great, could shake or disturb. With him, to be right was better than to be successful. He could tolerate no compromise with wrong, either in public or private life. His opinions on moral, political or professional subjects were always decided without being intolerant. He recognized charity in all its forms as one of the greatest virtues. Without desiring or intending to intrude upon the province of his professional brethren, who will doubtless feel it to be a "labor of love" to present, through some of the medical journals, a fitting memorial of his long and useful professional life, it is not inappropriate in this place to say that few men rose to greater eminence or success as a provincial practitioner in the healing art. No man in the profession, here or anywhere, was more punctual or attentive at the chambers of the sick and suffering. His genial presence acted like a charm upon his patients. His manner in the sick room was always kind and encouraging; it was not his habit to despair of his patients, nor permit them to despair of themselves.

His cheerful, almost playful, presence shed its magnetic influence on all those around him; and even the languor of the invalid, on the couch of sickness and pain, was made to yield to the influence of his wonderful flow of spirits. No man in the commonwealth, not in public life, could have passed from among us and left a greater void in the public mind, than that which has been created by the demise of Dr. Boerstler. Especially by the people of this county, will his memory be most gratefully cherished."

At a meeting of the physicians of Lancaster the following action was had:

The meeting was organized by the choice of Dr. Effinger Chairman, and Dr. A. Davidson Secretary.

A committee, consisting of Drs. P. M. Wagenhals, P. Carpenter and D. N. Kinsman, was appointed on resolutions. The committee reported the following, which was unanimously adopted:

Dr. Boerstler is dead. A great man has fallen. Old and full of years, he was gathered "like a shock of corn fully ripe." To the poor and suffering he was like the "shadow of a great rock in a weary land." At the bedside of the sick and dying he was tender and compassionate. He was jealous of the honor of his profession, and scourged with an unsparing hand any who attempted to prostitute it to the purposes of gain.

He was the earnest friend of the younger members of the profession, ever ready with counsel and advice in so unselfish a spirit that they came to regard him more as a father than as a competitor.

His was a strong and rugged character. He acted from

conviction alone. In his death we have lost a friend and a brother of solid professional acquirements.

He "went about doing good," and, fully equipped in his armor, fell.

At this meeting, appropriate resolutions were passed.

[For many years in the medical history of Ohio, Dr. Boerstler occupied a prominent and busy part. In 1841, Dr. Boerstler was President of the State Convention held at Columbus. Again in the organization of the Ohio State Society in 1846, he was made President of the preliminary meeting, as also President at the meeting in 1851 in Columbus. These several compliments show the standing and esteem in which he was held while an active member of the profession.

As a man and a physician, the article copied above shows how well he acted his honorable part, and how truly he was loved where he was best known, and filled up his measure of usefulness. E. B. S.]

LIST OF MEMBERS

OF THE

OHIO STATE MEDICAL SOCIETY,

With Post-office Address, date of Admission, and date of Death.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Ackley, H. A.*	Cleveland	1850	
Allen, Peter*	Kinsman	1850	
Agard, Aurelius H	Sandusky	1853	
Amos, C. E.*	Cleveland	1852	
Andrus, A.	Westerville	1872	
Angel, E.*	Akron	1852	
Applegate, Fred. C.	Windham	1859	
Almy, S. C	Cincinnati	1862	
Armstrong, T. H	Pawhatan Point	1862	
Allen, D. B.	West Liberty	1865	
Anderson, W. S.	Newtonville	1867	
Aiken, P. J	Newark	1869	
Alcorn, A. W.	Ravenna	1870	
Allen, Dudley	Oberlin	1870	
Arnold, Emil	Ironton	1872	
Ball, A	Zanesville	1848	
Baker, Timothy	Wooster	1851	
Baker, A. H.*	Cincinnati	1846	1865
Beach, C. H	Wellington	1868	
Belding, Alvin	Ravenna	1853	
Bell, E. R	Ripley	1871	
Beagrand, Pierce	Fremont	1853	
Bigelow, J. M	Lancaster	1846	
Boerstler, G. W.*	Lancaster	1846	1871
Boalse, A. N.*	Lockburn	1848	
Boyle, C. E.*	Columbus	1851	1870
Bonner, Stephen	Cincinnati	1847	
Brown, E. T.*	Logan	1849	
Bricker, W. R	Shelby	1848	

* Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Bronson, James	Newton Falls	1852	
Buckner, Philip J.*	Cincinnati	1850	
Butterfield, John*	Columbus	1846	1847
Bing, J. P	Pomeroy	1851	
Brown, A. M	Cincinnati	1851	
Brinkerhoof, D. H	Willoughby	1853	
Buckner, Wm.*	Hamilton	1853	
Burr, J. N	Mount Vernon	1853	
Brooks, J. H	Brownsville	1854	
Brennan, Thomas*	Dayton	1855	1858
Bell, A. E	Zanesville	1855	
Buckingham, E. M	Springfield	1855	
Brown, B. S	Bellefontaine	1855	
Brellen, Joseph	Grove City	1856	
Boyd, G. M	Xenia	1857	
Battles, W. S	Shreve	1858	
Brook, George W	Ellsworth	1858	
Bertolett, D. H	Letonia	1858	
Baker, Norman	Lucas	1858	
Bridge, W. W.*	Marion	1859	1864
Brayton, A	Cary	1859	
Beach, J. N	West Jefferson	1859	
Brenton, J. L	North Georgetown	1860	
Blizzard, S. R	Huntsville	1860	
Blackman, G. C.*	Cincinnati	1860	1871
Beeman, P	Iola, Kansas	1861	
Brooks, M. L	Cleveland	1861	
Bowers, E. D	Columbus	1861	
Beverly, P. F	Jerome	1862	
Beach, A. J	Belleville	1863	
Brown, J. C	Urbana	1863	
Buckner, J. H	Cincinnati	1863	
Bunce, Wm	Oberlin	1864	
Ballinger, Wm. J	Pleasant Valley	1864	
Brown, Wm. A	McConnellsville	1865	
Baggs, James	Ontario	1866	
Black, J. R	Newark	1867	
Besse, H	Delaware	1868	
Berlin, C	Wapakoneta	1868	
Blymer, A	Delaware	1868	
Blesch, P. E	Columbus	1869	
Bartholow, Roberts	Cincinnati	1869	
Bennet, John	Cleveland	1869	
Beardsley, C. E	Ottawa	1869	
Bertolett, W. J	Shreve	1869	
Brown, J. A	Degraff	1869	
Bracken, W. C	Jersey	1869	
Butler, G. W	Alton	1869	
Brainard, A. C	Orangeville	1870	
Bruce, A. G			
Bramble, D. D	Cincinnati	1870	
Boerstler, G. W., Jr	Lancaster	1870	

* Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Bertolett, J. B	Letonia	1870	
Bertolett, H. A	Washingtonville	1870	
Butler, George O	Cleveland	1870	
Ballard, H. D	Findlay	1870	
Brainard, H. C	Cleveland	1870	
Bennet, P. C	Freedom	1870	
Bishop, S. P	Delta	1870	
Bigney, P. M	Cincinnati	1871	
Bishop, L. W	Maineville	1871	
Bryant, W. G	Springfield	1871	
Cary, Abel*	Salem	1852	1872
Crume, P. M.*	Eaton	1847	1869
Conklin, H. S	Sidney	1849	
Cook, F.*	Atwater	1853	1857
Chamberlin, E. K.*	Cincinnati	1847	1847
Cotton, J. D	Marietta	1852	
Conner, P. S.*	Cincinnati	1853	
Coons, Israel A	Middletown	1853	
Cox, D. A.*	New Paris	1846	
Crook, James M	Dayton	1853	
Carroll, Thomas*	Cincinnati	1854	1871
Culbertson, Howard	Zanesville	1855	
Campbell, John	Uniontown	1855	
Caldwell, Joseph*	Huron	1857	1866
Cushing, H. K	Cleveland	1857	
Caruthers, John A	Kilbourne	1859	
Cadwallader, Rowland	Findlay	1862	
Cook, Charles C.*	Youngstown	1862	1863
Clark, Henry P	Ashland	1862	
Cutler, James	Bellepoint	1864	
Combs, J. S	Owensville	1865	
Comegys, C. G	Cincinnati	1871	
Clason, Thomas S	Bellefontaine	1865	
Carter, J. O	Marion	1866	
Corson, John	Middletown, Butler co.	1866	
Constant, W. S	Delaware	1866	
Coleman, Horace	Troy	1867	
Chessney, W. M	Kenton	1867	
Courtwright, G. S	Lithopolis	1867	
Conner, P. S	Cincinnati	1868	
Conklin, W. J	Dayton	1868	
Clark, John H	Mechanicsburg	1869	
Chase, B. S	Akron	1870	
Cassat, M	Cincinnati	1870	
Cutler, E. J	Cleveland	1870	
Carson, Wm	Cincinnati	1871	
Cottle, L. A	Maineville	1871	
Campbell, W. H	Concord, Ky	1871	
Carmichael, W. A	Loveland	1871	
Courtright, A. P	Cincinnati	1871	
Coble, D. W	Westerville	1872	
Coleman, David	West Union	1872	

* Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Danna, M.*	.....	1849....	.....
Delemater, John	Cleveland	1850....	1867
Dorsey, G. V.	Piqua	1850 ...	.....
Denig, R. M.	Columbus	1851....	.....
Dolman, Wm.†	Cleveland	1852....	.....
Dawson, W. W.	Cincinnati	1853....	.....
Davis, John	Dayton	1853....	.....
Dawson, John†	Columbus	1851....	1866
Davis, John	Cincinnati	1854...	.....
Donohoe, H. J.	Sandusky	1854....	.....
Dunlap, Alexander	Springfield	1854....	.....
Dodge, I. S.†	Cincinnati	1854....	1872
Dean, W. F.†	Milan	1857 ...	In army.
Dandridge, A. S.	Cincinnati	.....	.....
Darwin, Henry W.	Gettysburg	1859....	.....
Drake, J. L.	Lebanon	1859....	.....
Drury, Wm. H.	Columbus	1859....	.....
Dalton, N.	Logan	1860....	.....
Davis, Wm. B.	Cincinnati	1865....	.....
Dillon, Horace D.	Warren	1866....	.....
Dunlap, A S.	Springfield	1868....	.....
Doherty, G. A.	Cincinnati	1868....	.....
Dunlap, C. W.	Springfield	1869....	.....
Dalby, Isaac N.	Cleveland	1870....	.....
Day, E. A.	.....	1871....	.....
Dandridge, N. P.	Cincinnati	1871....	.....
Davis, D. T.	Dayton	1872....	.....
Ells, G. E.†	Lithopolis	1849....	1867
Estep, William	Lloydsville	1852....	.....
Edwards, J. D.	Xenia	1867....	.....
Ellis, A. N.	Lockland	1868....	.....
Eckman, Hiram	Tuscarawas	1869....	.....
Everhard, N. S.	Wadsworth	1870....	.....
Ebright, L. S.	Middlebury	1870....	.....
Erwin, R. W.	Athens	1872....	.....
Foulke, L. W.	Chillicothe	1850....	.....
Fyffe, E. P.†	Urbana	1851....	1867
Firestone, L.	Wooster	1852....	.....
Fuller, S. W.	West Liberty	1853....	.....
Foote, H. E.†	Cincinnati	1854....	1871
Falconer, Cyrus	Hamilton	1854....	.....
Foster, Nathaniel	Cincinnati	1854....	.....
Farrington, S. H.	Ashtabula	1856....	.....
Finch, S. F.	Green Springs	1857....	.....
Fries, George†	Cincinnati	1862....	1866
Follett, Alfred	Granville	.....	.....
Fuller, A. B.	Loudonville	1868....	.....
Finch, C. M.	Portsmouth	1869....	.....
Firestone, J. L.	Salem	1870....	.....
Frizzell, W. A.	Buena Vista	1872....	.....
Gay, N.	Columbus	1848....	.....
Gard, B. F.†	Columbus	1847....	1849

† Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Gillett, Bartley	Springfield	1849	
Gaston, E.*	Morristown	1849	1868
Gordon, T. W	Georgetown	1849	
Goble, P	Worthington	1849	
Gailey, J. D.*	Marion	1851	
Gille, L. C. C.*	Westville	1853	
Gerwe, F. A. J	Cincinnati	1854	
Gabriel, R. W.*	Dublin	1854	1860
Gotwald, A. G	Dayton	1854	
Green, M.*	Cambridge	1855	1856
Gilchrist, R. S	Degraff	1856	
Gabriel, J. F	Piqua	1856	
Gundry, Richard	Dayton	1856	
Guerin, Z. F	Westerville	1856	
Galpin, Loman	Milan	1857	
Gans, S.*	Cincinnati	1861	1864
Gonsaulis, C	Sparta	1863	
Griswold, Wayne	Circleville	1866	
Gray, S. S	Piqua	1867	
Goldrick, William	Delaware	1868	
Guyttard, F	New Bedford	1870	
Gawne, A. J	Sandusky	1870	
Guthrie, James W	Wooster	1870	
Gould, D. T	Cleveland	1870	
Gibson, R. McD	Seneca County	1871	
Green, J. H	Troy	1871	
Hills, R		1846	
Howard, R. L.*	Columbus	1846	
Helmick, J	Harrisburg	1849	
Hornbeck, L.*	New Carlisle	1849	1865
Hurxthall, F. T.*	Massillon	1849	
Huestis, Isaac	Chesterhill	1849	
Harley, L. G.	Dalton	1853	
Henderson, J. P	Newville	1850	
Hamilton, J. W	Columbus	1849	
Howard, E. W	Akron	1852	
Hopkins, Rudd C.*	Newburg	1852	In army.
Hildreth, C. C	Zanesville	1853	
Helmick, G. W.*	Harrisburg	1848	
Hoagland, C. N	Troy	1853	
Holston, J. G. F	Zanesville	1850	
Haines, Job*	Dayton	1853	1860
Hart, B. F	Marietta	1854	
Haines, V.*	Cambridge	1853	1865
Henderson, D. W	Waynesville	1856	
Hubbard, J. C	Ashtabula	1856	
Harmon, Julian	Warren	1857	
Hitchcock, James	Port Clinton	1857	
Hughes, J. W.*	Berlin Center	1858	1869
Hall, W. E	Fayetteville	1859	
Houston, J. T	Jamestown	1859	
Hill, E. L	Oxford	1857	

* Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Hagett, J. P.*	Eaton	1861	1862
Hays, William	Melfordton	1862	
Hyatt, E. H	Delaware	1862	
Hamil, J. J	Newark	1863	
Henderson, R. A	Upper Sandusky	1865	
Herrick, H. J	Cleveland	1865	
Hadley, Edwin	Richmond	1865	
Hill, N. S	Newville	1866	
Hunt, Charles	Wooster	1866	
Hopkins, D. O	St. Paris	1866	
Hazzard, J. S. R	Springfield	1867	
Hill, H	West Alexandria	1867	
Hendrickson, Hugh	Lewis Center	1868	
Hunt, A. H	Blackleyville	1868	
Harrison, Eugene	Napoleon	1869	
Higgins, C. W	Big Plain	1869	
Halderman, D	Columbus	1869	
Hough, J. B	Ridgeville	1869	
Heuston, R. C	Oxford	1868	
Heighway, A. E	Cincinnati	1870	
Hurd, A	Findlay	1870	
Houghton, J. W	Wellington	1870	
Hobson, J. F		1870	
Hadlock, J. W	Cincinnati	1871	
Herrick, L. C	Cleveland	1871	
Hall, N	Cumminsville	1871	
Hyde, William	Fulton county	1871	
Hall, J. M	Fayetteville	1871	
Hoff, J. W	Pomeroy	1872	
Holdt, George	Cincinnati	1871	
Huggins, R. D	West Alexandria	1871	
Hall, C. B	Millersport	1872	
Hall, Camillus	Burlington	1872	
Isham, A. B	Walnut Hills, Cin'ti	1872	1867
Judkins, J. P.*	Cincinnati	1846	
Johnson, William*	Delaware	1850	
Judkins, William*	Cincinnati	1847	1861
Jones, T. W	South Bloomfield	1847	
Junkens, M. W	Bellair	1859	
Joseph, A. P	Fairmount	1862	
Jones, R. E	Gomer	1863	
Johnson, R. A	Wellsville	1864	
Jacobs, W. C	Akron	1866	
Jenner, A. E	Crestline	1866	
Jennings, E	Dayton	1867	
Jones, A. B	Portsmouth	1868	
Jones, W. H	Cleveland	1868	
Jones, L. M	West Liberty	1869	
Jewett, W. H	Hilliard	1869	
Jennings, J. D	Sonora	1869	
Jobes, J. A	Palestine	1870	
Jewett, M	Middleburg	1870	

* Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Jones, J. D.	Newburg.	1870.	
Jones, D. J.		1870	
Jones, N. M.	Cleveland	1870.	
Jewett, H. S.	Dayton.	1871.	
Kirtland, J. P.	Cleveland	1846.	
Kable, W. R.*	Bellebrook.	1846.	1859
Kreider, M. Z.*	Lancaster.	1846.	
Keever, M. H.	Ridgeville	1850.	
Kay, Isaac	Springfield	1853.	
Kincaid, W. P.	New Richmond	1854.	
Kennedy, J. C.	Batavia	1854.	
Keyt, A. T.	Walnut Hills, Cin'ti.	1872.	
Kyle, J. G.*	Xenia.	1856.	1870
Kennedy, J. L.*	Batavia.	1864.	1866
Kinsman, D. W.	Circleville	1864.	
Kelley, H. R.	Galion	1868.	
Kemps, J. D.	Vandalia.	1868	
Knowlton, A. P.	Olmstead Falls.	1870.	
Kinnaman, J. W.	Ashland	1870.	
Kirby, Jacob.	Hillsboro.	1871	
Kitchen, B. F.	Clay Post Office.	1872.	
Landon, G. W. H.			
Lewis, D			
Landon, C. P.	Westerville.		
Langworthy, O. B.			
Lyman, C. N.			
Lamme, W. H.			
Lane, E. S.			
Lathrop, H.*	Columbus.	1846.	1849
Lawson, L. M.	Cincinnati	1853.	1864
Leonard, B. B.	West Liberty	1854.	
Loving, S.	Columbus	1858.	
Longfellow, A. J.	Fostoria.	1861.	
Loller, W. B.	Nashville.	1864.	
Leonhard, C. S.	Ravenna	1865.	
Longworth, W. N.	Van Wert.	1866.	
Little, J. A.	Delaware.	1868.	
Lord, J. M.	Chesterville	1868.	
Lewis, W. C.	Rushville.	1869.	
Lee, E. B.	Garrettsville.	1870.	
Lewis, Edward C.	Canal Dover.	1870.	
Luddington, H.	Cincinnati	1871.	
Larimore, F. C.	Mount Vernon	1871.	
Lang, E. R.	Portsmouth	1871.	
Ludlow, J.	Cincinnati	1871.	
Logan, W. M.	Cincinnati	1871.	
Maris, G. W.	Columbus	1848.	
Mitchell, G. F.*	Mansfield.	1850.	1869
Mussey, R. D.*	Cincinnati	1847.	1866
Murphy, J. A.	Cincinnati.	1872.	
Moore, W. C.	Wooster	1852.	
Millikin, Samuel*	Hamilton.	1853.	

* Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Metz, Abram	Massillon.	1852	
Moore, Jonas*	Marietta.	1852	1856
Merriman, A.*	Madison	1853	1867
Mack, John	Shelby	1853	
Martin, Joshua*	Xenia	1853	1857
Mosgrove, J. M.	Urbana	1853	
Mount, William*	Cumminsville	1853	1866
Muscroft, C. S	Cincinnati	1854	
Marshall, N. T.*	Cincinnati	1854	
Mendenhall, G.	Cincinnati	1854	
Mussey, W. H.	Cincinnati	1854	
Morehead, W.*	Zanesville	1855	1861
Mullen, T. J.	New Richmond	1855	
Matson, A. F.*	Logansville.	1857	1867
Miller, A. C	Orrville	1858	
Mahlman, C. H. W.	Columbus	1859	
Mounts, J. L.	Morrow	1860	
Moe, L. W.	Ottawa	1860	
Maranda, Isaac	New Carlisle	1860	
Matchett, W. H.	Greenville	1862	
Maynard, A	Cleveland	1863	
Mitchell, M.*	Mansfield	1863	1864
Morse, Joel	Cleveland	1863	
Moore, William.	New Lisbon	1865	
Mitchell, George.	Mansfield.	1868	
Moore, Eugene L.	Moscow	1868	
Morse, D. A.	Midway.	1868	
Moore, E.	Warren	1868	
Miles, A. J.	Cincinnati	1869	
Morris, F. B.	Ross	1869	
Moore, A. C	Amelia	1869	
Mahlman, H. A.	Columbus	1869	
Miller, Thomas V.	Columbus	1869	
Metcalf, C. T.	Warren	1870	
Miller, T. C.	Cleveland	1870	
Miller, C. A	Orrville	1871	
Mouser, J. A.	La Rue.	1870	
Murray, L. S.	Medina.	1850	
Morgan, E. D. S.	Berlin	1872	
Moor, James.	Ironton.	1872	
Mondham, A. B.	Jackson	1872	
McGuire, W. B.*	Waynesville.	1848	
McLean, R. R	Lockbourne.	1861	
McLaughlin, A. C.	Tremont.	1852	
McFarland, J. A.	Tiffin.	1850	
McNally, Thomas.	Chillicothe	1853	
McNeal, F. D.*	Canal Dover.	1854	
McIlvaine, R. R.	Cincinnati	1854	
McMeans, R. R.*	Sandusky	1854	1862
McDormat, C.	Dayton.	1857	
McBeth, J. C.	Galion	1858	
McCarty, Oliver	Polk Post Office	1862	

* Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
McBride, Alexander	Berea	1865	
McConnel, C. N	Upper Sandusky	1865	
McElwe, S	New Castle	1866	
McEbright, Thomas G	Akron	1866	
McKinley, C. G	Sunbury	1866	
McClure, James	Lee	1866	
McClurg, John	Center Village	1867	
McNeal, F. B	Troy	1867	
McNeely, J. S	Dalton	1867	1868
McCracken, W. A.*	Springfield	1867	
McCuskey, H	Batavia	1868	
McCallough, J. G	Bealsville	1868	
McLaughlin, R	Butler	1869	
McGraw, Aaron	Burton	1869	
McCardy, John	Youngstown	1870	
McKean, William	Mount Hope	1870	
McGuire, J	Norwalk	1870	
McCullom, E. J	Seneca County	1871	
Norton, J. C.*	Marion	1848	
Nicholson, W. A.*	Cleveland	1853	
Noble, David	Hillsboro	1860	
Neal, T. L.	Dayton	1863	
Neil, Alexander	Sunbury	1868	
Noble, C. D	Oberlin	1870	
Oliver, J. Q.*	Cincinnati	1854	
Owen, H. W	Mount Vernon	1862	
Orr, G. B	Cincinnati	1871	
Owsley, J. B	Jacksonburg	1871	
Price, Joseph	Randolph	1852	
Purple, J. G.*	Brooklyn	1853	
Peck, W. L	Columbus	1853	
Potter, J. F.*	Cincinnati	1854	1868
Preston, J. C	Brunswick	1857	
Pomerine, Joel	Millersburg	1858	
Pearce, Enoch, Jr	Steubenville	1859	
Patterson, A. V	Mansfield	1861	
Potter, Amos	New Madison	1863	
Pease, L. T	Williamsburg	1863	
Pullen, G. W	Logan	1864	
Paige, W. F	Johnstown	1864	
Phillips, H. W	Kenton	1866	
Pearce, H. C	Urbana	1867	
Pomeroy, O	Chardon	1869	
Pratt, E. B	Mount Sterling	1869	
Pearce, L. E	Cable	1869	
Pomerene, P. P	Berlin	1870	
Perrin, J	Cleveland	1870	
Pixley, Sumner	Peninsula	1870	
Palmer, C. D	Cincinnati	1871	
Peck, W. V	New Richmond	1872	
Primrose, J. P	Nelsonville	1872	
Russell, J. W	Mount Vernon	1848	

* Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Risinger, J. F.*	Galion	1849	1866
Robertson, Charles	McConnellsville	1849	
Rives, L. C.*	Cincinnati	1850	1870
Reeves, W. H.	Springfield	1849	
Rogers, Robert	Springfield	1847	
Rodman, Thomas S.*	Cleveland	1852	
Robertson, James*	Perrysburg	1853	1854
Rigdon, L.*	Hamilton	1853	1865
Rives, Landon	Cincinnati	1853	
Rogers, J. G	New Richmond	1853	
Rusk, Daniel	Malta	1855	
Reamy, T. A	Zanesville	1855	
Robinson, J. D	Wooster	1856	
Robinson, J. N	Medina	1856	
Robb, Andrew	Blanchester	1859	
Rodgers, J. H	Springfield	1859	
Raymond, B	Carroll	1860	
Rathbun, C	Salem	1860	
Reeve, J. C	Dayton	1861	
Reid, J. T.*	Fairfield	1863	1864
Ralston, D. H	Granville	1864	
Reed, C. R	Middleport	1864	
Reed, William	Iberia	1865	
Reed, R. C. S	Glendale	1867	
Richie, J. A	Ontario	1867	
Rice, J. B	Fremont	1868	
Ropp, W. P	Delaware	1869	
Roots, W. Y	Milford Center	1869	
Rankin, A. H	Sandusky	1870	
Ridenour, W. T	Toledo	1870	
Russell, J. W	Mount Vernon	1870	
Reed, A. N	Norwalk	1870	
Reed, A. B	Brooklyn Village	1870	
Randall, R	Bath	1870	
Rosenfeldt, A	Cincinnati	1871	
Skinner, J. S.*	Columbus	1849	
Steele, H. K	Dayton	1851	
Sachse, G. J.*	Columbus	1846	1860
Smith, S. M	Columbus	1846	
Smith, James	Elkhorn	1850	
Smith Edmond*		1850	1850
Seldon, O. G	Shanesville	1851	
Silver, D. H.*	Columbus	1851	1864
Stanton, Benjamin*	Salem	1852	1861
Story, R.*	Cleveland	1852	1866
Smith, A. C.*	Medina	1852	1861
Shotwell, John T.*	Cincinnati	1850	1850
Sanders, Moses*	Norwalk	1853	
Shaedford, R. J.*	Medway	1853	1868
Sharp, W. T.	Middleburg	1853	
Smith, J. A.*	Piqua	1853	1858
Stevens, E. B.	Cincinnati	1853	

* Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Spillman, Henry*	Medina	1855	1862
Scarf, W. D	Bellefontaine	1855	
Scott, W. J	Cleveland	1855	
Sheppard, W. A	New Vienna	1856	
Sinnett, E	Granville	1850	
Snodgrass, J. M	Ostrander	1850	
Stevenson, A. G	Richmond	1856	
Stilwell, Thomas	Fremont	1857	
Shively, J. W	Massillon	1858	
Schurtzer, J. V	Massillon	1858	
Schwab, Louis	Portsmouth	1872	
Salisbury, J. N	Russelville	1872	
Sweney, R. L	Marion	1859	
Scovllle, S. S	Lebanon	1859	
Sharpe, E. C.*	Williamsburg	1859	1868
Southard, J. M	Marysville	1860	
Stephenson, J. H	Leesville	1860	
Spees, S. J	Hillsboro	1863	
Smith, J. W	Wellington	1863	
Stamp, Jacob	Mount Vernon	1866	
Sprague, James	Vienna X Roads	1866	
Scobey, W. E.	Hamilton	1866	
Stansell, J. A	Forest	1866	
Sellers, A	Lebanon	1867	
Stockstill, J. W	New Carlisle	1867	
Stewart, J. W	Dayton	1868	
Shouse, B. A	Antioch	1868	
Shields, T. P	Watkins	1868	
Seaton, A. M	Midway	1869	
Schueller, J. B	Columbus	1869	
Steeley, H. G	Sidney	1869	
Smith, Harry	Mount Vernon	1869	
Steward, S. H	Newburg	1869	
Shoemaker, J. W	Napoleon	1869	
Silver, J. G	St. Louis	1869	
Stanley, E	Sandusky	1870	
Scott, A. J	Loudonville	1870	
Sykes, W. H	Plymouth	1870	
Speece, N. V	Quincy	1870	
Sherman, A. M	Kent	1870	
Silver, D. R	Applecreek	1870	
Selden, Robert	Shanesville	1870	
Smith, D. B	Cleveland	1870	
Stark, W	Cincinnati	1871	
Seely, W. W	Cincinnati	1871	
Shackelton, E. L	St. Marys	1871	
Sensamen, H	Tremont	1871	
Snyder, D. J		1871	
Stanton, Byron	Cincinnati	1871	
Shepherd, W. W	Hillsboro	1871	
Sayler, William	Gratis	1871	
Taylor, James L	Wheelersburg	1872	

* Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Thompson, John B.	Columbus	1846	
Thompson, M.*	Mount Vernon	1850	1867
Thompson, Robert*	Columbus	1846	1865
Tilden, D. J.*	Toledo	1850	
Tullis, J. W.*	Troy	1851	
Tappan, Benjamin*	Steubenville	1852	
Thompson, J. C.	South Bloomfield	1848	
Tipton, R. H.	Darbyville	1853	
Treon, John	Miamisburg	1853	
Taliaferro, William T.*	Cincinnati	1854	1871
Tilden, Daniel*	Sandusky	1856	1870
Turney, S. D	Circleville	1856	
Taggart, T. M.*	Dalton	1857	1867
Thomas, K. G.*	Alliance	1858	1869
Thompson, J. W.*	Columbus	1860	1862
Thompson, A. W	Circleville	1862	
Thompson, W. R.	Montgomery County.	1871	
Turnbull, John	Xenia	1863	
Tnrney, Joseph	Nevada	1864	
Thorn, E.	Yellow Springs	1867	
Thurston, R. C.	Oxford	1868	
Todd, Joseph	Shreve	1868	
Tichenor, E. J.	Lebanon	1869	
Terry, C.A	Cleveland	1870	
Titus, A.	Wheelersburg	1871	
Underwood, A. H.	London	1869	
Underwood, W. J.	Akron	1869	
Vattier, J. L.	Cincinnati	1850	
Van Pearse, James*	Columbus	1850	
Van Tuyl, D. R.*	South Bend	1850	
Van Tuyl, H.*	Dayton	1853	
Vanatta, E.	Fultonham	1855	
Vandervort, J. W.	Harveysburg	1864	
Vaughters, Thomas G.	Portsmouth	1872	
White, John*		1848	
Wilson, J. F.			
Wright, M. B.	Cincinnati	1852	
Woodward, Charles.	Cincinnati	1851	
Woodward, Warren.	Cincinnati	1871	
Williams, A. S.	Fostoria	1852	
Wood, D. B	Cincinnati	1852	
Woods, John R.	Warren	1871	
Wilson, Samuel.	Wooster	1854	
Wilson, Albert.	Sidney	1854	
Wade, D. E.	Cincinnati	1854	
Williams, E.	Cincinnati	1856	
Weber, G. C. E.	Cleveland	1857	
Wilson, W. F.	Ironton	1856	
Welsh, B. F.	London	1859	
Wright, T. L.	Bellefontaine	1860	
Weeks, G. R.	Bloomfield	1860	
Williams, T. B.	Delaware	1860	

* Deceased.

NAME.	POST-OFFICE ADDRESS.	ADMITTED.	DIED.
Wallace, R.*	Lewisburg	1861	1865
Wigton, A. E.*	Delaware	1861	1862
Woods, J. T.	Findlay	1862	
Woody, Robert	Eaton	1863	
Wilson, W. H	Greenfield	1865	
Weatherby, A. S.	Cardington	1865	
Weaver, J. M.	Wooster	1865	
Wirth, R.	Columbus	1865	
Woodworth, M. C.	Warren	1866	
White, J. H.	Delaware	1866	
Wylie, A. N.	Ripley	1866	
Woodruff, L.	Alton	1867	
Willis, P. A	Bellepoint	1868	
Waterman, H. C.	Middleport	1868	
Williams, D. S.	West Independence	1868	
Willis, T. A.	Bellepoint	1868	
Williams, A. D	Cincinnati	1868	
Wheaton, J. M.	Columbus	1869	
Wagenhals, P. M.	Lancaster	1869	
Wiggins, C. W.	Big Plain	1869	
Watt, William.	Kenton	1870	
Whiting, L. M.	Canton	1870	
Woodbridge, T.	Youngstown	1870	
Weed, Frank J.	Cleveland	1870	
Waggoner, Joseph.	Ravenna	1870	
Wallace, J. H.	Canaan	1870	
Warren, Guy	Garrettsville	1870	
Whittaker, J. T.	Cincinnati	1871	
Worthington, A. T. C.	Middletown	1871	
Wesley, Robert.	Athens	1872	
Warren, J. A.	Wheelersburg	1872	
Wilson, C. M.	Miami Springs	1872	
Wilson, D. C.	Ironton	1872	
Wylie, J. L.	Ripley	1872	
Westbrook, A. E.	Ashley	1872	
Williams, Lee E.		1872	

* Deceased.

HONORARY MEMBERS.

Professor H. H. Childs, Pittsfield, Massachusetts.
" Charles A. Lee.
" William Tully,* New Haven, Connecticut.
" J. Knight, New Haven, Connecticut.
G. B. Guthrie, M.D., New York City.
M. J. Bailey, M.D., New York City.
R. R. McIlvaine, M.D., New York City.
Professor Willard Parker, New York.
J. H. Brower, M.D., Lawrenceburg, Indiana.
M. M. Harding, M.D., Indiana.
George Sutton, M.D., Indiana.
J. C. Blackburn, M.D., Covington, Kentucky.
J. L. Hayes, M.D., Philadelphia, Pennsylvania.
Professor R. D. Mussey,* Cincinnati, Ohio.
R. E. Houghton, M.D., Richmond, Indiana.
Robert Thompson,* M.D., Columbus Ohio.
G. W. Boerstler,* M.D., Lancaster, Ohio.
W. B. Lyons, M.D., Huntington, Indiana.
J. M. Stevenson, M.D., Pennsylvania.
J. M. Kitchen, M.D., Indianapolis, Indiana.
S. P. Hunt, M.D., Sterling, Illinois.
G. S. B. Hempstead, M.D.
H. K. Steele, M.D., Denver, Colorado.
P. Beeman, M.D., Iola, Kansas.
Dr. Awl.

* Deceased.